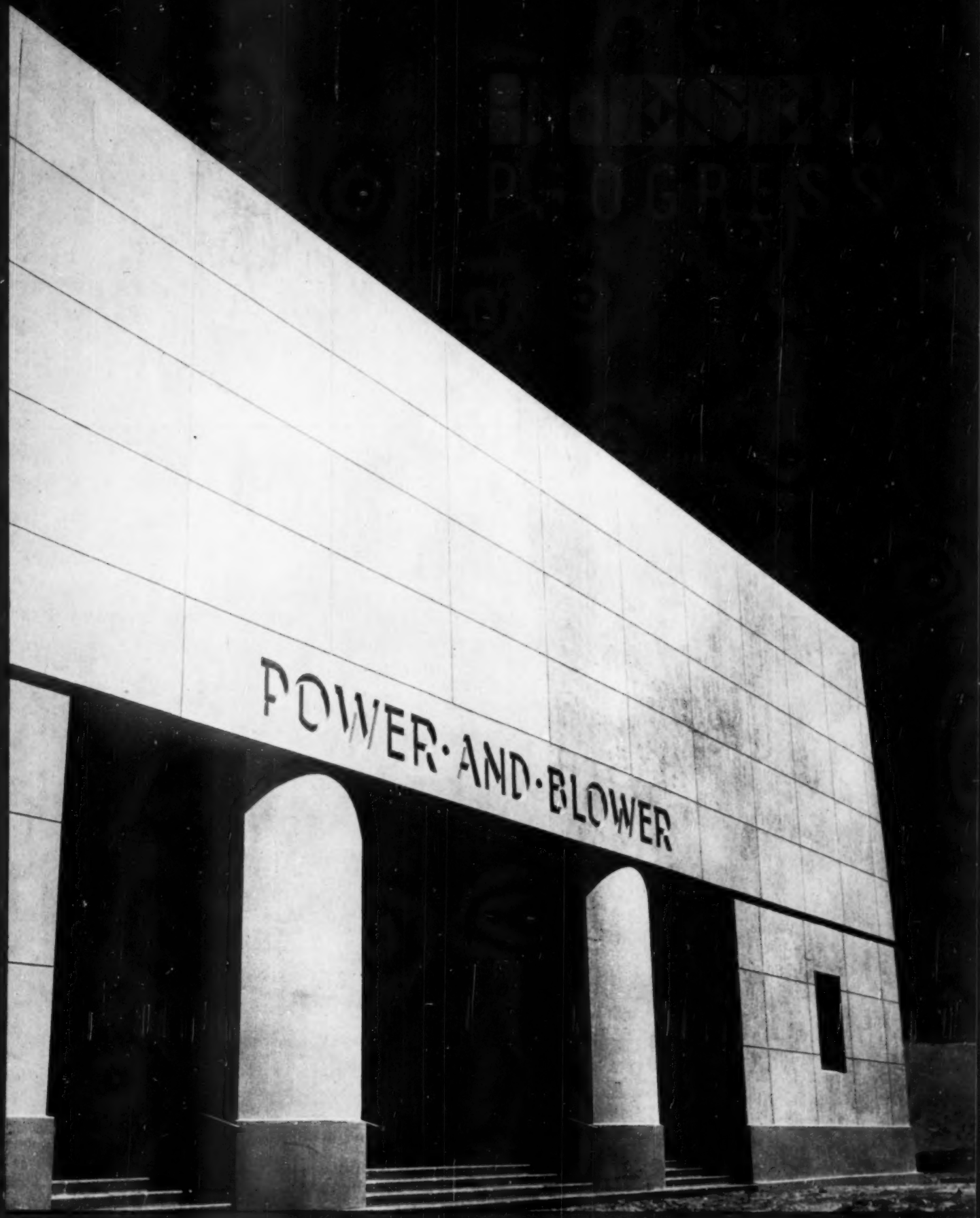
IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR



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OCTOBER 1950

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KEEP ENGINES ... CUT COSTS

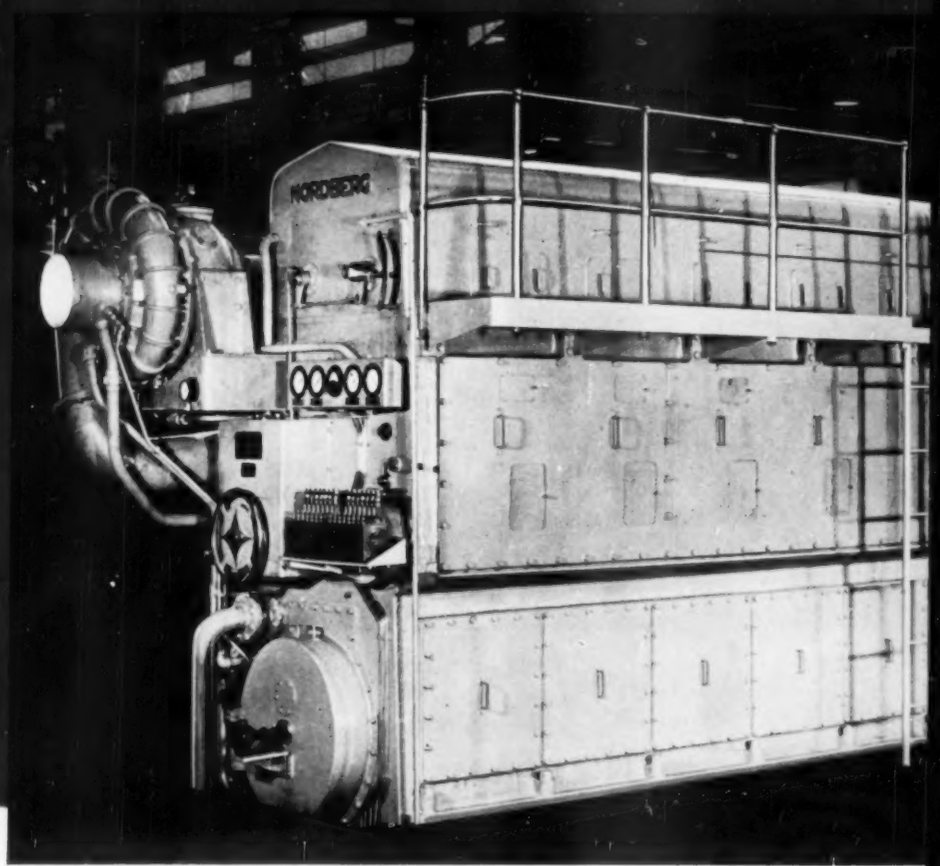


Photo courtesy Nordberg Mfg. Co.

TUNE IN . . .
TEXACO STAR THEATER
starring MILTON BERLE
on television
every Tuesday night.
See newspaper for
time and station.

TEXACO

TEXACO

DIESEL PROGRESS for October, 1950. Volume XVI, Number 10. DIESEL PROGRESS is published monthly by Diesel Engines, Inc., 816 North La Cienega Boulevard, Los Angeles 46, California. Rex W. Wadman, President. Subscription rates: $5 per year, single copy 50c. Acceptance under 34.64, P. L. & R., authorized.

CLEAN

Maintenance costs and fuel consumption come down when you lubricate with TEXACO URSA OILS

Engines—whether Diesel, gas or dual-fuel, large or small—all run cleaner when lubricated with *Texaco Ursa Oils*. That means more trouble-free operation . . . better compression and combustion . . . less fuel used . . . less maintenance expense.

Texaco Ursa Oils have exceptional resistance to oxidation. They keep harmful carbon and sludge from forming and keep rings free for proper seal. They also protect bearings from corrosion, reduce wear, and extend the life of all moving parts.

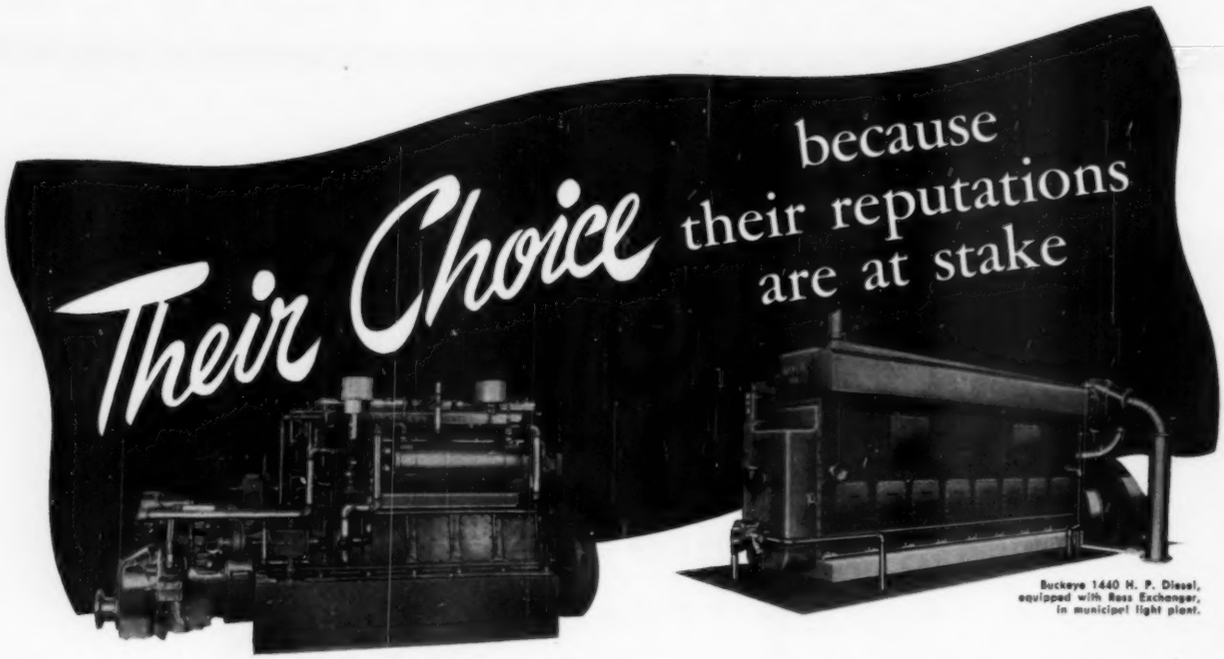
Leading engine builders approve *Texaco Ursa Oils* and operators everywhere prefer them. For instance, in the Diesel field —

More stationary Diesel h.p. in the U. S. is lubricated with Texaco Ursa Oils than any other brand.

Step up the efficiency of your engines and reduce your operating costs. A Texaco Lubrication Engineer will gladly help you. Just call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 E. 42nd St., New York 17, N. Y.

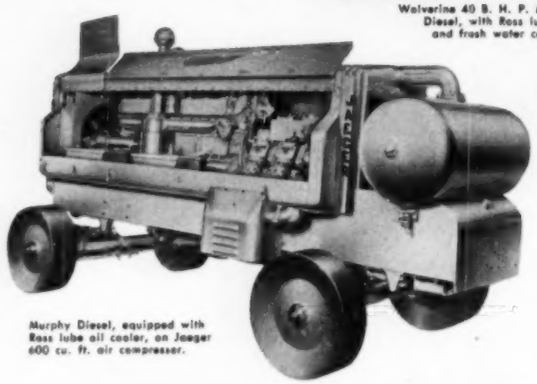
URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

Their Choice because their reputations are at stake

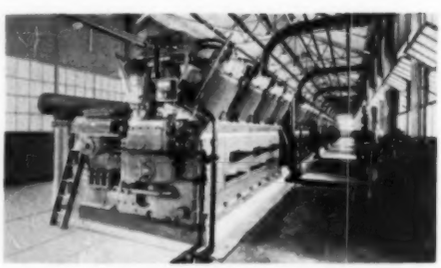


Buckeye 1440 H. P. Diesel, equipped with Ross Exchanger, in municipal light plant.

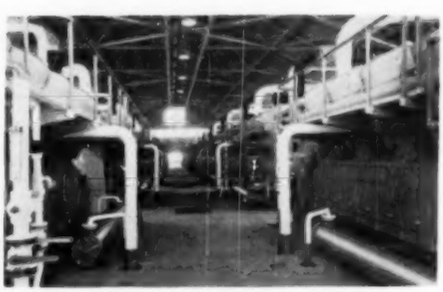
Wolverine 49 B. H. P. Marine Diesel, with Ross lube oil and fresh water coolers.



Murphy Diesel, equipped with Ross lube oil cooler, on Jaeger 600 cu. ft. air compressor.



Nine Cooper-Bessemer gas compressors, equipped with Ross lube oil coolers, serving natural gas pipe line.



One of 14 Ingersoll-Rand 1000 H. P. gas compressors, equipped with Ross lube oil coolers, serving natural gas pipe line.

Engineering, uncompromising in its thoroughness, workmanship carried out with utmost care and precision . . . these are the prime elements that go into the making of a Diesel today . . . the prime elements that enable it to be the efficient work horse that it is.

But the thoroughness, care and precision that gain a higher reputation for one maker over another, can not and *do not* stop with the components that are manufactured in his own plant. Outside-made components and accessories must, ***necessarily***, measure up to the same standards.

And so it is that such leaders as Wolverine, Buckeye, Murphy, Ingersoll-Rand, Cooper-Bessemer (to name a few), whose engines are shown here, are insistent that their exchangers conform wholly with rigid standards. That they have used Ross for many, many years, is a natural choice. Over 81% of the Diesel engine builders do the same.

For, maintaining safe and effective lube oil and jacket water temperatures are jobs that Ross Shell and Tube Exchangers have a reputation for doing well . . . and to put it in Wolverine's words, "It's things like these that helped build Wolverine's reputation for long-life, low-maintenance Diesels."

★ **Design Data** . . . and complete details on Ross cost-saving standardization: **BULLETIN 1.1K1**, all copper and copper alloy, fixed tube sheet Type BCF; **BULLETIN 1.7K1**, all stainless steel, fixed tube sheet Type SSCF; **BULLETIN 2.1K1**, cast iron or steel shell, removable bundle Type CP; **BULLETIN 2.2K1**, all copper and copper alloy, removable bundle Type BCP.

Write on Company letterhead to Ross Heater & Mfg. Co., Inc., Division of American Radiator and Standard Sanitary Corp., 1425 West Ave., Buffalo 13, N. Y. In Canada, Horton Steel Works, Limited, Fort Erie, Ont.

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Serving home and industry

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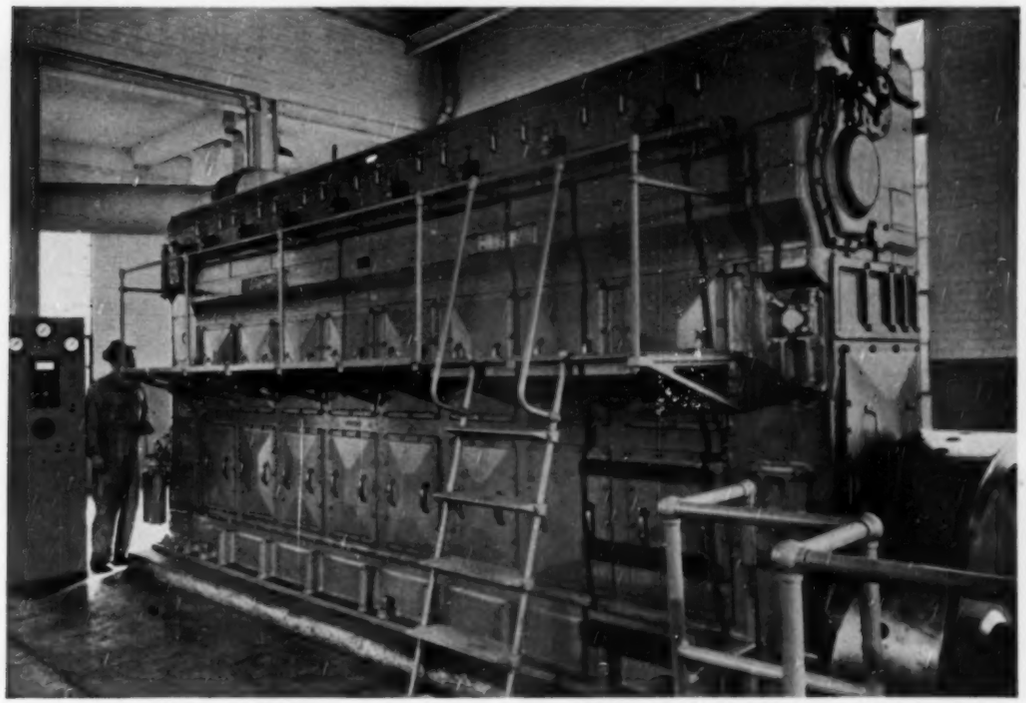


Lower Cost Power From Standby Superior Results in a Full-Time Job

Folks in an Iowa City needed additional power for peak loads to supplement the two steam turbines in their Municipal Power Plant. To get this power economically they chose a Model 80 Supercharged Dual Fuel Superior.

In normal operation in this municipal system the Superior engine operates on gas. But when necessary, the Dual Fuel feature permits instant conversion from gas to oil. All the operator has to do is push a button to select the type of fuel. Mixing adjustments on Superior Dual Fuel engines are automatically controlled for any combination of fuels.

The plant engineers found that the Superior engine was producing electrical power cheaper than the regular steam turbine units. As a result the standby unit was given a full-time job to reduce operating costs.

The remarkable success of this Superior engine application is not unusual. Chances are, the same results can be accomplished for you. A Superior representative will be glad to call at your convenience and show you how it can be done. In the meantime, write for your free copy of *Superior Diesel For Stationary Application.*

THE NATIONAL SUPPLY COMPANY
SUPERIOR ENGINE DIVISION
Plant and General Sales Office: Springfield, Ohio

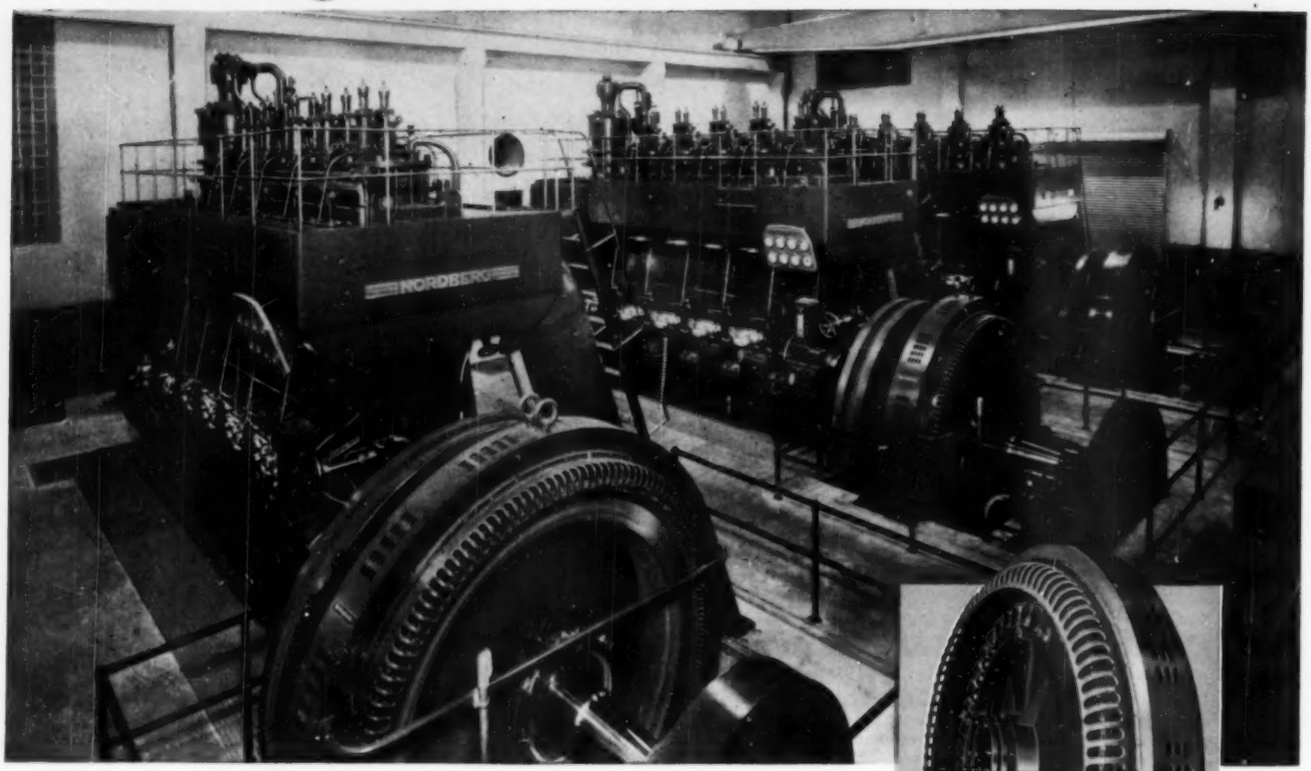
THE NATIONAL SUPPLY COMPANY NSCO

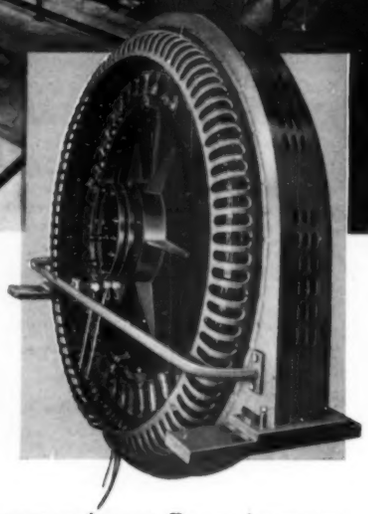
Superior DIESELS

Locomotive • Marine • Oil Field • Stationary

YOU CAN BE **SURE**.. IF IT'S

Westinghouse





Tough load problem solved with Westinghouse A-C Generators

A large western cement plant needed generating units to supply its power requirements including a 1000-hp motor. Starting motors this size puts a heavy load on the generators . . . causes considerable voltage drop. But, voltage drop had to be minimum. Consequently, standard generating units couldn't do the job. The diesel manufacturer—supplier of the complete unit—asked Westinghouse to build special generators to handle the job. The results are pictured above—another successful Westinghouse A-C Generator installation.

This example shows the problem-solving ability Westinghouse offers in building special generators for unusual applications.

Make certain you get the benefit of Westinghouse engineering on your next equipment. Power Apparatus Specialists—in principal cities—will help you select and apply the right equipment to the job. Consult them for any present or future plans.

Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21572

Westinghouse

DIESEL ENGINE DRIVEN AC GENERATORS

STANDARD ENGINEER'S REPORT

RPM DELO

TEST DATA

LUBRICANT	RPM Delo Supercharged Lubricating Oil
UNIT	Caterpillar Diesel-D17000-V8 Cyl.
CONDITIONS	Cont. High load-Actual field oper.
FUEL	Commercially available Diesel Fuel
TEST PERIOD	4 months
FIRM	Homer Jones Ranch, Chandler, Ariz.

Stopped all ring sticking where ordinary oil failed!

AFTER ONLY 625 HOURS operation on an ordinary heavy-duty type oil, an engine pulling 90% of full load rating had 39 stuck rings — only 9 of its 48 rings were free and several were broken. There were heavy lacquer and carbon deposits in ring grooves and on piston-skirts, as indicated by this unretouched photograph of one of the pistons. Besides stuck rings, note clogged oil-return holes and oil rings.

OPERATED 1582 HOURS — more than twice as long — on RPM DELO Supercharged-2 Lubricating Oil, the same engine, running under the same load and fuel conditions, stayed efficient and clean, as this unretouched photograph shows. At the end of test all 48 rings were free, with no piston-skirt deposits. Ring-groove deposits were 50% less. Note how RPM DELO Supercharged-2 kept oil-return holes open.

REMARKS: RPM DELO Supercharged-2 Lubricating Oil is one of four grades in the RPM DELO Oil line. It solves operating problems in both Diesel and gasoline engines, especially where load conditions are extreme.

Its detergent prevents carbon and lacquer deposits on all parts, even with high sulphur-content fuels.

RPM DELO Supercharged-2 Oil sticks on hot and cold surfaces — reduces wear under the heaviest loads. (Cylinder-wear averaged only 0.0014 inches per 1000 hours with RPM DELO Supercharged-2, while with the ordinary oil it was 0.0043 inches — three times greater.) RPM DELO Supercharged-2 Lubricating Oil also contains special compounds that resist oxidation and sludging, prevent bearing corrosion and internal rusting, and stop foaming.

FOR MORE INFORMATION about the proper grade of the new RPM DELO Oils to fit your particular requirements, or the complete line of RPM Lubricants, and the name of your nearest "RPM" Distributor, write or call any of the companies listed below.

STANDARD OIL COMPANY OF CALIFORNIA • San Francisco
THE CALIFORNIA OIL COMPANY • Barber, N. J., Chicago
STANDARD OIL COMPANY OF TEXAS • El Paso, Texas
THE CALIFORNIA COMPANY • Denver, Colorado

NEW "CATERPILLAR" HEAVY-DUTY UNITS use Federal-Mogul Bearings and Bushings

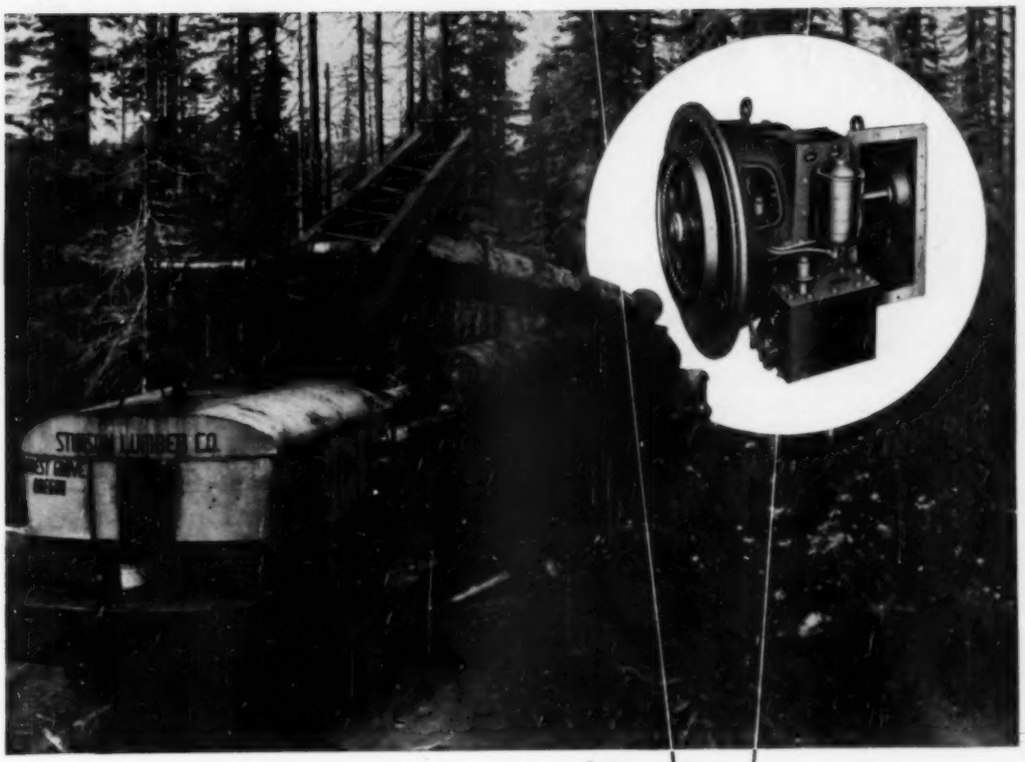
Now "Caterpillar" offers the heavy construction contractor two new "equipment packages" – the DW20 Tractor and W20 Wagon for earth moving, and the 2-wheel Diesel prime mover "Cat" DW21 with the No. 21 Scraper–rugged, large-capacity earth-movers for off-the-road work.

The Federal-Mogul sleeve bearings and bushings used in these models are designed and manufactured to complement the famous heavy-duty dependability built into all "Caterpillar" units.

FEDERAL Mogul

FEDERAL-MOGUL CORPORATION, 11039 SHOEMAKER, DETROIT 13, MICHIGAN

"Caterpillar" DW20 Tractor and W20 Wagon at work on a heavy earth-moving job.



Lash-proof Loading...

When the Stimson Lumber Company repowered the Lima Loader on their Forest Grove, Oregon, show, they installed a Twin Disc Hydraulic Torque Converter on the GM Diesel.

And according to Superintendent A. V. Fisher, the result is "the smoothest operator in the woods."

One reason, of course, is the "lash-proof loading" assured with Twin Disc Torque Converters. You can hoist faster, swing faster, spot faster, because shocks are absorbed . . . power is smooth and controlled by the throttle alone. When you need it, engine output torque is automatically multiplied up to five times with the Twin Disc Torque Converter.

On *any* combination of prime mover and driven equipment, smoother operation will result from the installation of a Twin Disc Torque Converter.

There is a Twin Disc Torque Converter for every engine in the 40 to 1,000 hp range. Write today for your copy of Bulletin 135-C.

A Twin Disc Hydraulic Torque Converter helps make this Lima Loader a "smooth operator." On this same show you'll also find Twin Disc Torque Converter-equipped yarders and tractors.

Inset: Twin Disc Hydraulic Torque Converter (Lysholm-Smith type).

Clutches & Hydraulic Drives

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • SEATTLE • TULSA

WHICH WOULD THE CHIEF PICK?

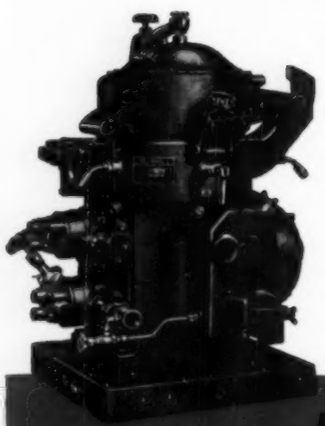
Ask any chief engineer which he'd rather have in his oil as a contaminating agent — water or dirt — and he'd tell you right off, "Get them ***both*** out—they're ***both*** bad." The way to get both liquid and solid impurities out of oil most advantageously is by means of a De Laval Oil Purifier.

A De Laval Oil Purifier employs centrifugal force to best advantage to remove from turbine or diesel oil every bit of moisture—whether a few drops of condensate or a cupful or more of water. It separates out this water and discharges it continuously —a De Laval Purifier keeps the oil ***safely dry***.

The De Laval machine also promptly removes any solid impurities, storing them safely out of harm's way in the bowl. Throughout the entire time that the purification run lasts, a De Laval centrifuge continues to purify oil at the same constant high efficiency. This is a feature of De Laval design.

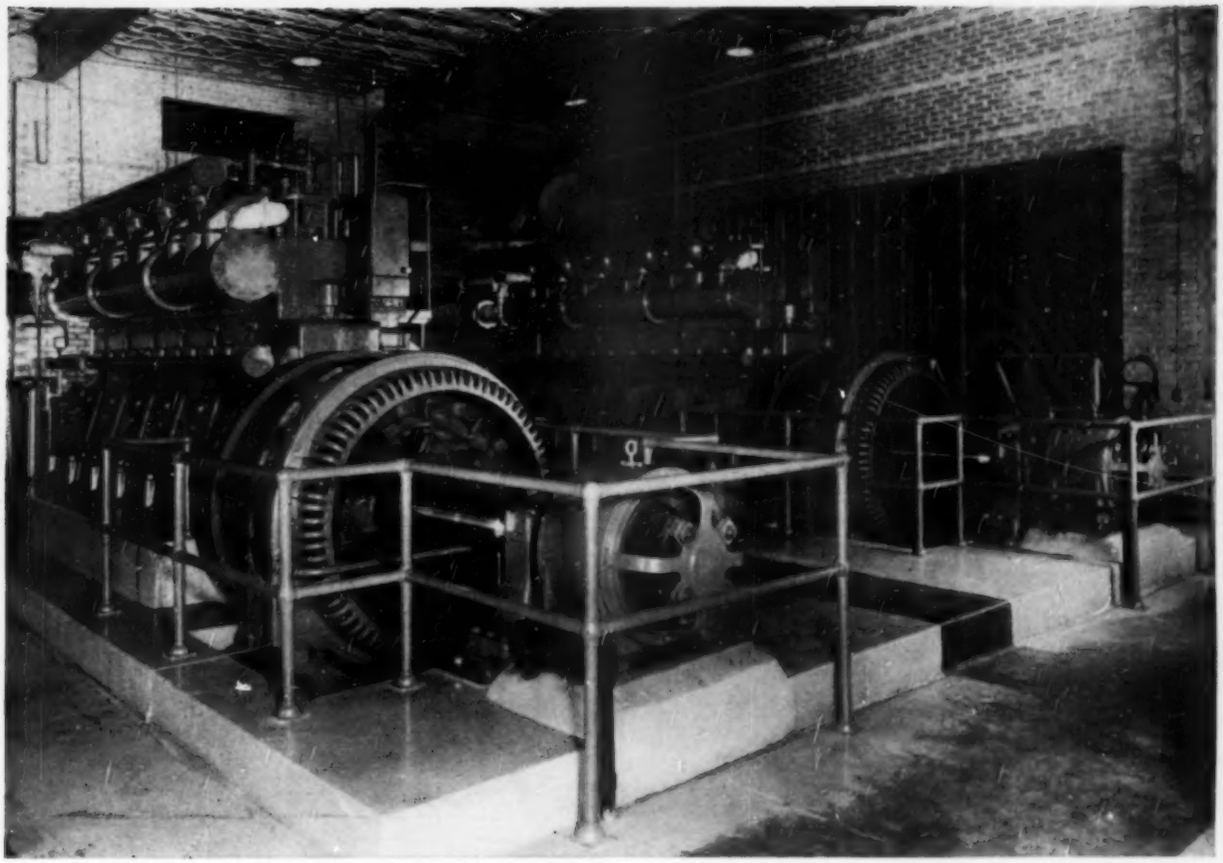
De Laval protection is ***full*** protection. Why risk any half-way measures?

THE DE LAVAL SEPARATOR COMPANY
165 Broadway, New York 6 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5
THE DE LAVAL COMPANY, Limited, Peterborough, Ont.



DE LAVAL
CENTRIFUGALS

FOR BETTER ENGINE ROOM PERFORMANCE



Puts the finger on ring troubles . . .

● Operators of a midwest rural power station found themselves running into serious maintenance troubles. In their two Worthington Diesel engines, rings were sticking and blow-by was fouling crankcases. They decided to discuss the problem with a Standard Oil lubrication specialist.

STANDARD HD
TRADE MARK
Diesel Oil

He advised them to switch the units from the conventional lubricant being used to STANDARD HD Diesel Oil. Tougher operating conditions, he explained, called for the use of a lubricant having high oxidation resistance and excellent detergent qualities.

The first sign of better lubrication with STANDARD HD came with the disappearance of crankcase breather smoke, previously caused by stuck rings and blow-by. When inspections were made, they showed rings free, ring grooves and crankcases clean. At the end of a year, operators reported: *maintenance problem solved, fuel economy improved, lubricant consumption reduced.*

You'll find that the benefits of STANDARD HD Diesel Oil and the service of a Standard Oil lubrication specialist will add up to real savings for you. A Standard specialist has the experience and training to help you gain maximum benefits from Standard's fuels and lubricants. This man is located near your plant and will give you "on-the-spot" service. Arrange today, for his visit by contacting the nearest Standard Oil office or by writing to: Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY (INDIANA) STANDARD

New ESSO TUG No. 9. Built by Gulfport Shipbuilding & Drydock Corp., Port Arthur, Tex. Owned and operated by Esso Standard Oil Co.

NEW

DIESEL-ELECTRIC TUG FOR ESSO

MORE evidence that vessel operators are recognizing the efficiency of Diesel-Electric Marine Drive is afforded by the Esso Standard Oil Co. Latest addition to the Esso fleet is the new Diesel-Electric ESSO TUG No. 9, built for use in New York Harbor and adjacent waters.

GM
GENERAL MOTORS
DIESEL
POWER

ENGINES FROM
150 TO 2000 H.P.

Leader in Diesel engineering development for 38 years

Cleveland Diesel Engine Division

CLEVELAND 11, OHIO

GENERAL MOTORS

General Motors Diesel-Electric Drive has powered more than 700 vessels in 22 different classifications.

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Washington 6, D. C.

CAMBRIDGE, MASS.
Walter H. Moreton Corp.
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Cambridge 41, Mass.

NORFOLK, VA.
Curtis Marine Co., Inc.
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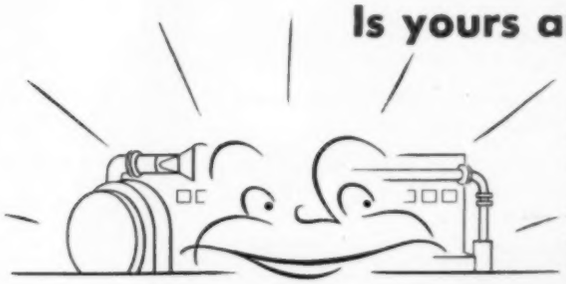
Cleveland Diesel Engine Div.
General Motors Corp.
445 Harrison Street
San Francisco 5, Calif.

DIESELS THRIVE ON SINCLAIR GASCON OILS

A 2,000 hp, 300 rpm Fairbanks-Morse engine in Municipal Light plant, Kennett, Mo., operating on Sinclair Gascon Oil HD.

Is yours an "EASY" operation?



Then use Sinclair Gascon Oils, without additives. If your diesels run free from overloads, repeated peak demands, long idling periods, and free from unusually high, low, or fluctuating cooling water temperatures then Sinclair Gascon Oils are recommended.

Sinclair Gascon Oils have low carbon-forming tendencies. Their natural cleansing action keeps engines clean, promoting full power and low maintenance . . . with economical oil and fuel consumption.

Is yours a "TOUGH" operation?

Then use Sinclair Gascon Oils, HD. If your diesels are subject to repeated or continuous overloads, high jacket and crankcase temperatures, idling periods, then Sinclair Gascon Oils HD should be specified.

These are heavy-duty, additive-type oils with greater cleansing and dispersion action, greater resistance to oxidation. They preclude bearing corrosion and are non-foaming. They keep diesel engines clean despite punishing operating conditions and assure oil, fuel, and maintenance economy.

SINCLAIR INDUSTRIAL OILS

For lubrication counsel, see your nearest Supplier of Sinclair Products or write Sinclair Refining Company, 630 Fifth Avenue, New York 20, N. Y.

Dirt-Proof

your Fuel and Lube Oil
With AC Elements

FOR FUEL FILTERS

FOR LUBE OIL FILTERS

Millions of hours of service stand behind the AC Fuel Oil Elements engineered for factory equipment Diesel fuel filters. For their full life, these precision-built elements actually "Dirt-Proof" the fuel. As protection for fuel injectors and transfer pumps, AC Elements are unequalled.

Standard equipment on G.M.C. Truck and Coach, Flxible Bus, and Detroit Diesel.

AC Elements are also available for nearly every make of lubricating oil filter.

These AC Elements are so efficient that they "Dirt-Proof" your lube oil.

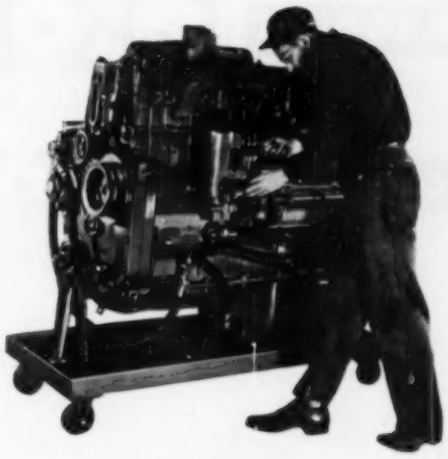
ONLY CLEAN OIL IS SAFE OIL!

AC OIL FILTERS

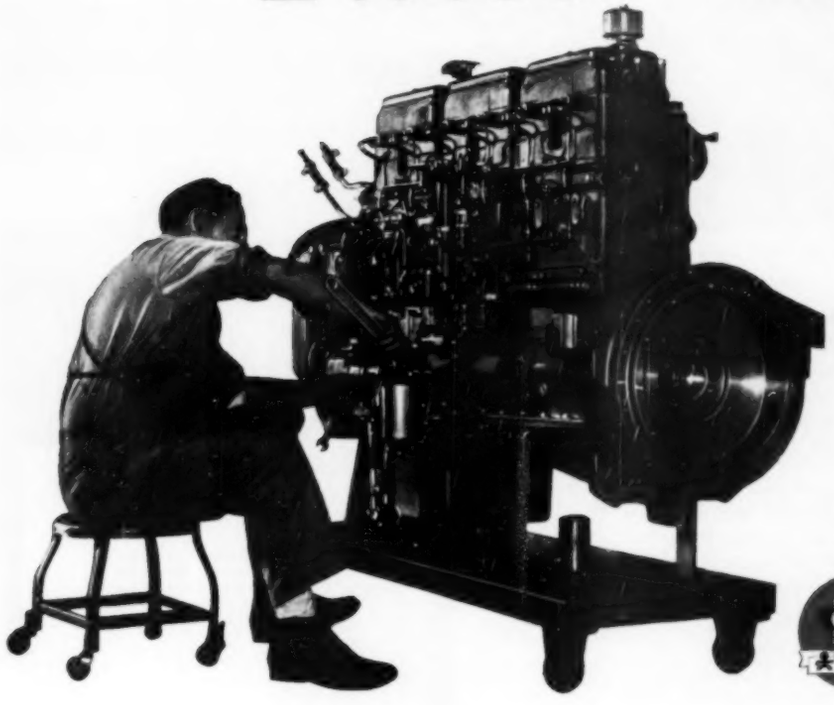
AC SPARK PLUG DIVISION • GENERAL MOTORS CORPORATION

Cummins® Custom-built Diesels

Built not once but Twice



The engine that's built better to give power at lower cost



Why is a lightweight, high-speed Cummins Diesel the best buy in economical, dependable power? *Because every* part of *every* engine is made under strictest quality control methods. Each engine also is actually built *twice*. After initial assembly, each engine is run-in on the test block. Then it is torn down and carefully re-inspected—after that it is re-assembled and tested *again*.

Perfection in engine craftsmanship . . . Cummins exclusive fuel system . . . an unexcelled service and parts organization . . . mean that rugged, dependable Cummins Diesels make more profits for power users.

There's a model for your power needs. Contact your Cummins dealer. He has more facts to show you about making more profits with

Diesel power by CUMMINS

CUMMINS Industrial DIESEL

TRADEMARK REG. U.S. PAT. OFF.

CUMMINS ENGINE COMPANY, INC. · COLUMBUS, IND.

EXPORT: CUMMINS DIESEL EXPORT CORPORATION
Columbus, Indiana, U. S. A. · Cable: Cumdiex

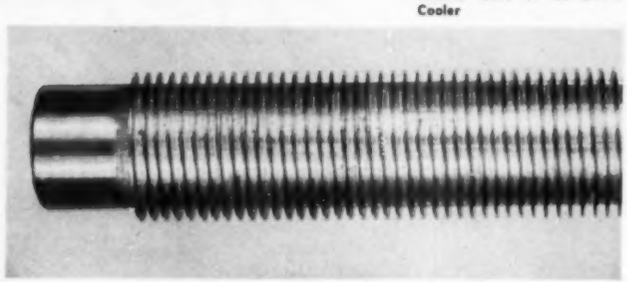
Lightweight High-speed Diesel Engines (50-550 hp) for: On-highway trucks · off-highway trucks · buses · tractors · earth-movers · shovels · cranes · industrial locomotives · air compressors logging yarders and loaders · drilling rigs · centrifugal pumps generator sets and power units · work boats and pleasure craft.

For dependable cooling of Lube Oil and Jacket Water

WATER COOLED LK·FIN COOLER

AIR COOLED FIN·FAN COOLER

G-R Type LK-Fin Tubular Cooler with helically-finned tubes



Portion of LK-Fin heat transfer element used in the LK-Fin Cooler

G-R offers a choice of *two* efficient and reliable units for maintaining the lube oil and jacket water of your Diesel engines at the correct temperatures for best operating results.

If you have a sufficient supply of raw water, select the LK-Fin Cooler. This tubular exchanger has finned type cooling elements with four times the heat transfer surface of bare tubes. As a result, the LK-Fin Cooler is far more compact, besides being lighter in weight and less costly than bare-tube units for the same duty. In addition, the LK-Fin Cooler has several other distinctive features that provide effective design and long-lived construction with economical maintenance.

If your raw water supply is insufficient or undependable, the Fin-Fan Cooler will provide effective cooling by air. This unit, developed jointly by Griscom-Russell and Fluor Corp. Ltd., is in wide use on a great variety of cooling and condensing services. It operates entirely independent of the direction or velocity of the wind and may be installed wherever convenient, within a building, or on the ground, or on a roof.

The cooling elements of the Fin-Fan Cooler, like that of the LK-Fin Cooler, have helical fins originated by Griscom-Russell for more efficient cooling. This design, developed more than 25 years ago, has proven its effectiveness and durability in many tens of thousands of cooling and condensing units.

Write for complete data on whichever type of G-R Cooler best meets your cooling water conditions, and information will be sent you without obligation of any kind.

Fin-Fan Air-Cooled Heat Exchanger, showing G-R K-Fin Cooling Sections on top of the structure and with part of the side wall cut away to show the motor-driven fan

THE GRISCOM-RUSSELL CO., 285 MADISON AVE., NEW YORK 17, N. Y.

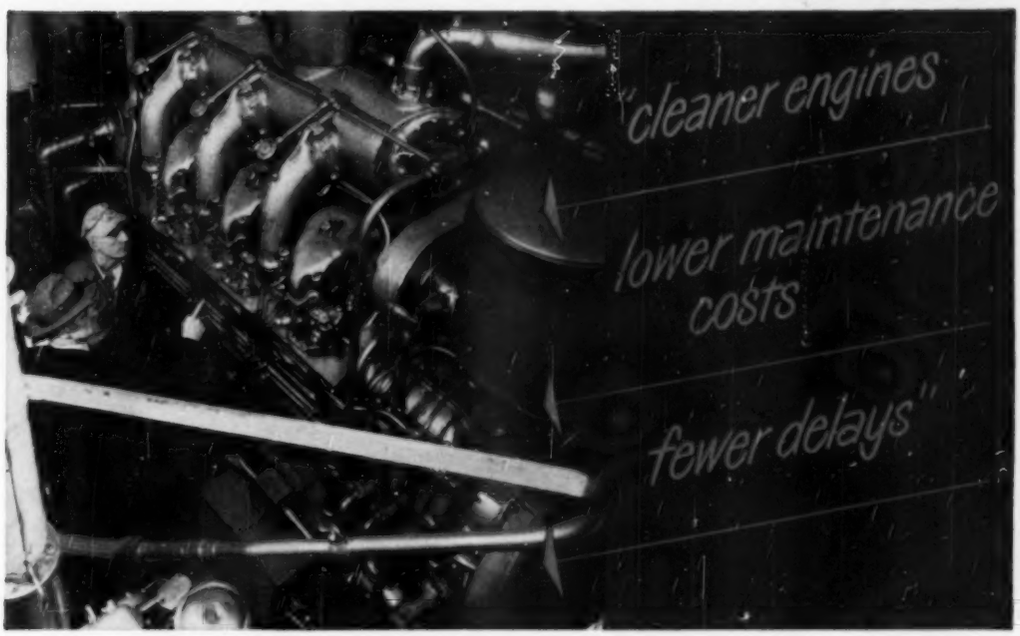
CR-556

GRISCOM-RUSSELL

PIONEERS IN HEAT TRANSFER APPARATUS

"We get better lubrication with *Gulf Dieselmotive Oil*"

say Diesel operators



More and more Diesel operators are specifying Gulf Dieselmotive Oil, the outstanding detergent-type lubricant for industrial, marine and railroad Diesels. They report that this quality oil provides effective protection against excessive wear and at the same time keeps engines clean.

Solvent refined from quality crude stocks, Gulf Dieselmotive Oil contains a highly effective detergent for best results in heavy duty service. It helps keep rings sludge-free—prevents ring sticking, excessive oil consumption, and blow by. This means fewer operating delays, fewer overhauls, lower maintenance costs.

Here's practical help on any lubrication or maintenance problem for the user of Gulf Dieselmotive Oil: the cooperative services of a trained Gulf Lubrication Engineer. Write, wire, or phone today and ask a Gulf Lubrication Engineer to call.

GULF

Gulf Oil Corporation · Gulf Refining Company

GULF BUILDING, PITTSBURGH, PA.

Sales Offices - Warehouses
Located in principal cities and towns throughout
Gulf's marketing territory

*UNIFORMITY

Under all conditions the proved performance of Tycol lubricants more than meets their recommended service.

Rigidly controlled and tested during manufacture . . . and refined from the highest grade crudes, Tycol oils and greases are known for their *UNIFORMITY within each classification — from the first drum to the last.

This unvarying high quality, plus the scope of the line, accounts for Tycol's wide acceptance by industry interested in maximum production . . . top efficiency . . . lowest operating cost.

Whatever your lubrication need, let a Tide Water Associated engineer help you select the one suited for your particular need. Call, write or wire your nearest Tide Water Associated office for full details.

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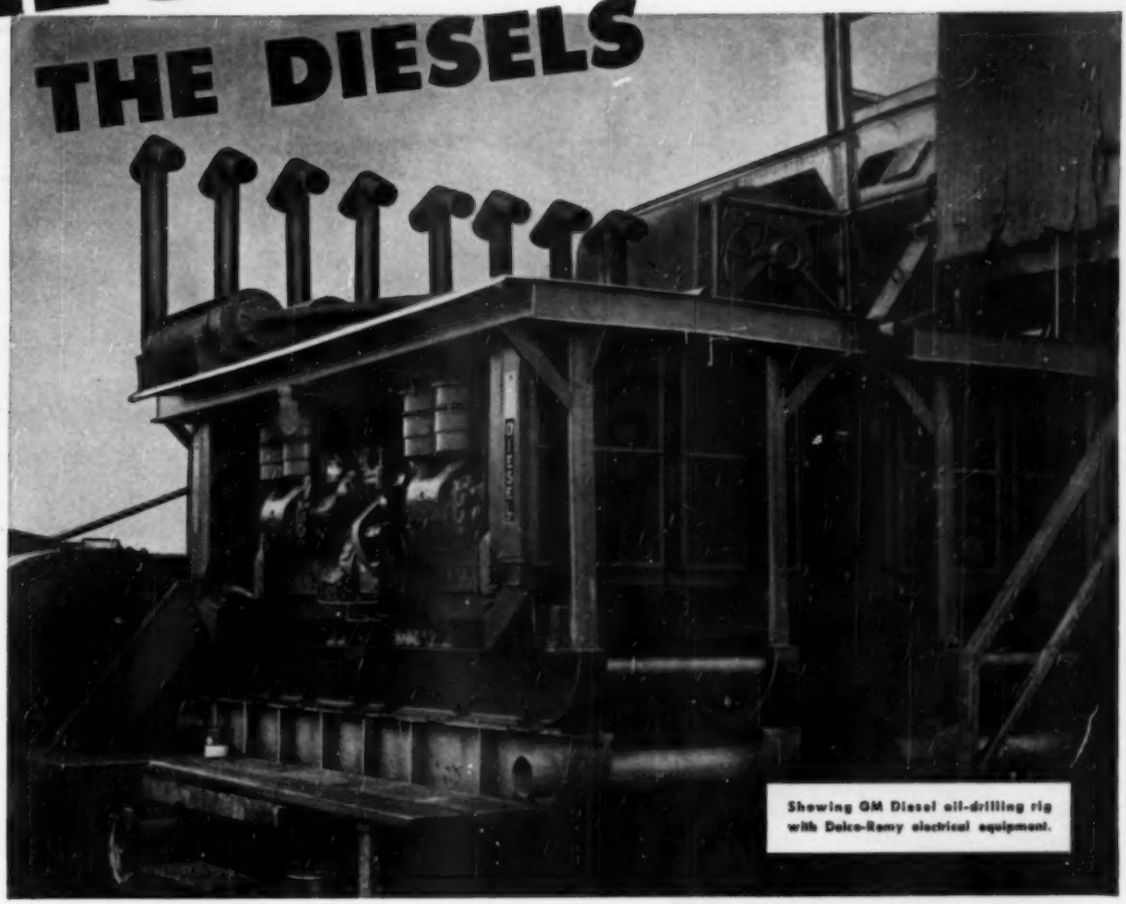
17 BATTERY PLACE · NEW YORK 4, N.Y.

*LEARN WHAT THIS PRODUCT CHARACTERISTIC MEANS TO YOU — READ "LUBRICANIA"
This informative handbook, "Tide Water Associated Lubricania," gives clear, concise descriptions of the basic tests used to determine important properties of oils and greases. For your free copy, write to Tide Water Associated Oil Company, 17 Battery Place, New York 4, N. Y.

REFINERS AND MARKETERS OF VEEDOL — THE WORLD'S MOST FAMOUS MOTOR OIL

DELCO-REMY ON THE DIESELS



Showing GM Diesel oil-drilling rig with Delco-Remy electrical equipment.

DIESELS ON THE JOB

Oil drilling is a rugged business—good business for rugged Diesel equipment.

And where there are Diesels you will find Delco-Remy heavy-duty electric units, designed to match the ruggedness and efficiency of the Diesel engines.

Diesel plus Delco-Remy is an on-the-job combination that has delivered reliable performance since Diesels became a factor in the oil industry.

UNITED SERVICE MOTORS

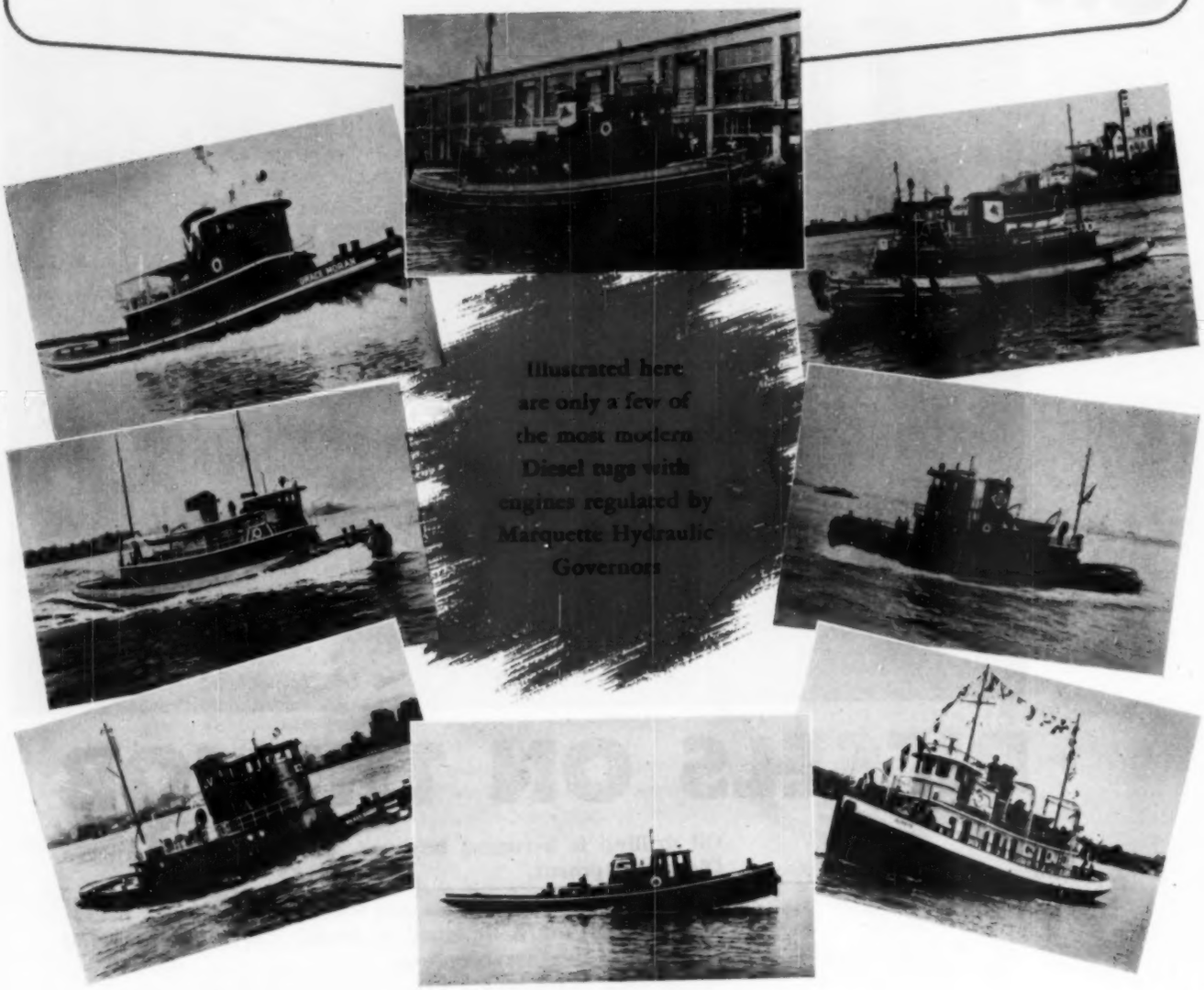
DELCO-REMY—A UNITED MOTORS LINE
Service Parts and Delco Batteries
Available Everywhere Through
UNITED MOTORS DISTRIBUTORS

Delco-Remy
DIVISION, GENERAL MOTORS CORPORATION
ANDERSON, INDIANA

DELCO-REMY • WHEREVER WHEELS TURN OR PROPELLERS SPIN

Marquette HYDRAULIC GOVERNORS

...FIRST CHOICE IN AMERICAN HARBORS


Illustrated here are only a few of the most modern Diesel tugs with engines regulated by Marquette Hydraulic Governors

The Marquette METAL PRODUCTS CO.
CLEVELAND 10, OHIO
SUBSIDIARY OF CURTISS-WRIGHT CORPORATION

Also Manufacturers of
ROLLER BEARING TEXTILE SPINDLES
WINDSHIELD WIPERS FOR AIRCRAFT, TRUCKS AND BUSES
FUEL OIL PUMPS AND INJECTORS
PRECISION PARTS AND ASSEMBLIES

Now available . . . New "Caterpillar" Diesel DW20 wheel type tractor and W20 wagon. Capacity: 25 cu. yards earth. Power is protected with Purolator Oil Filters.

When the job is earth-moving . . .

No matter what you do . . . as long as the job has to do with earth, engines are bound to suck in abrasive-laden dirt.

Unless you remove this destructive load from the oil stream —you're in for expensive repairs, for costly lay-up time.

Here—as under any other rugged operating conditions—you can rely on a Purolator* Micronic Oil Filter.

Purolator's exclusive Micronic* element traps abrasives measured in microns (.000039 of an inch) . . . has a revolutionary accordion-pleated design which provides a filtering area as much as 10 times that of old-style oil filters. What's more, it does not remove the important additives.

For lube oil, Purolator's more efficient filtration assures less wear on hard-working bearings and other vital parts.

For fuel oil, it means the complete filtration job so vital because of close tolerances of injector plungers and parts.

We know that Purolator can solve your filtering problem. Let our engineering staff show you how!

*Reg. U. S. Pat. Off.

PUROLATOR PRODUCTS INC.
Rahway, New Jersey and Toronto, Ontario, Canada

Protect your Power with Purolator!

PUROLATOR
MICRONIC OIL FILTER
"FIRST IN THE FIELD OF FILTERING"

To Trim Your Diesel Down

Diesel engines no longer handicap the equipment they are installed in. No longer are heavy—bulky—or waste precious space.

Engine builders, in squeezing more horsepower into less space, have turned to aluminum. With aluminum, they lighten superchargers, frames and crankcases to half their ordinary weight. Aluminum pistons, supercharger impellers and connecting rods smooth vibrations—lessen inertia. And weigh less, too.

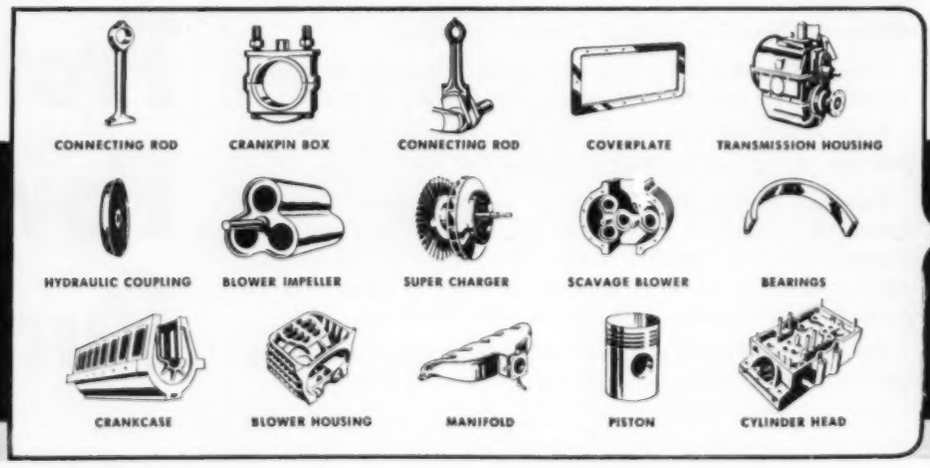
How was size reduced? By helping engines work harder. Aluminum lets pistons and rods move faster. Pistons and heads of aluminum can soak up the extra heat of higher mean effective pressures and piston speeds. Another way of saying aluminum makes engines lighter, smaller and/or more powerful.

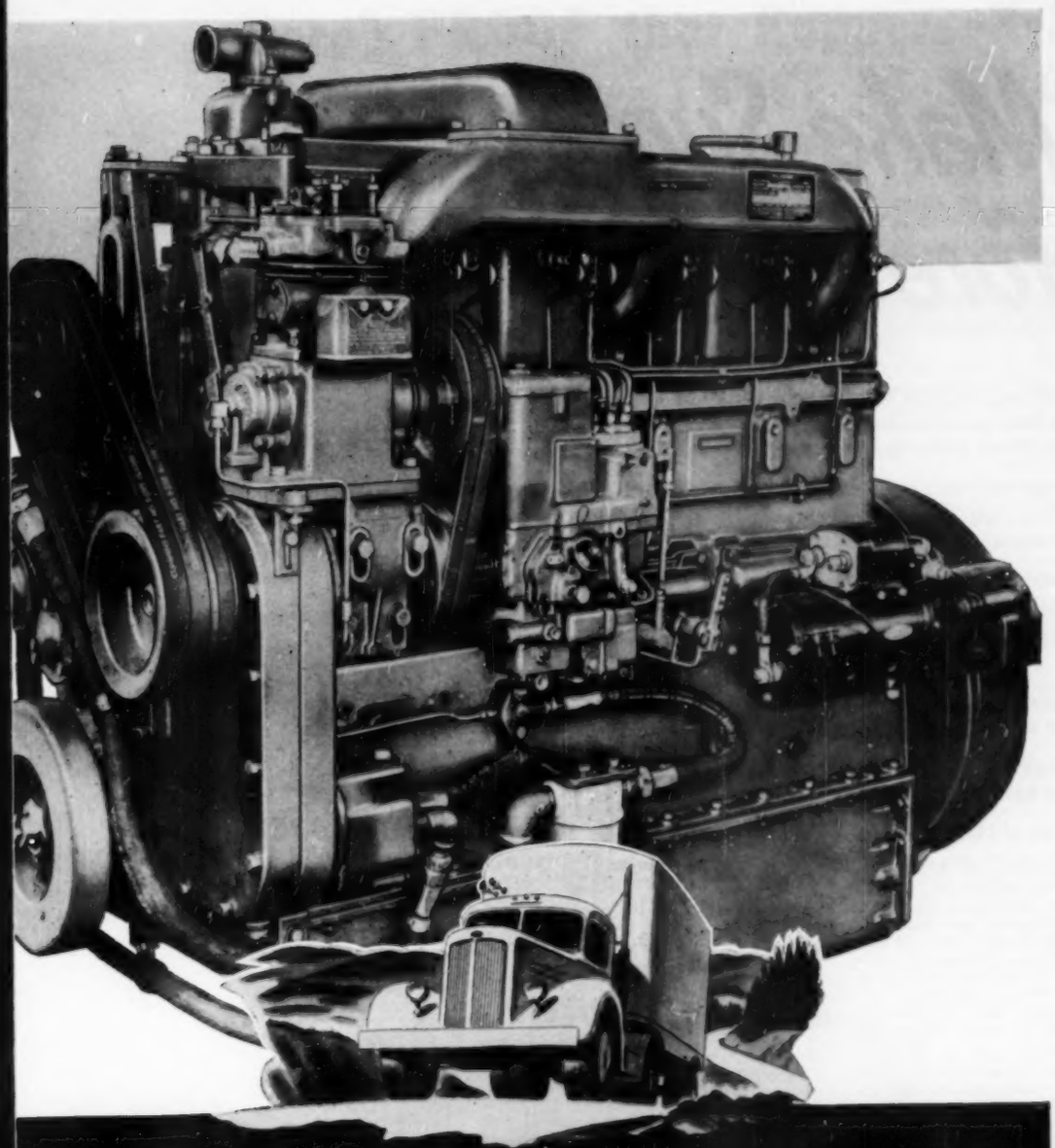
Aluminum makes better bearings. Their one-piece construction eliminates hard metal backing—eliminates bond failures. And for sheer bearing stamina you can't beat aluminum. More conductive of heat—more resistant to corrosion—stronger in repeated stress—stronger at elevated temperatures.

When you shop for diesels of any size—shop for aluminum. It's a sure sign of a better engine buy.

IF YOU BUILD DIESEL ENGINES . . .

Alcoa supplies engine builders with semi-finished parts from 5 modern foundries, 2 forge shops, 2 die casting plants. Alcoa researchers have worked with engine builders for the past 25 years in developing lighter, smaller, more powerful diesels. For complete information, write: ALUMINUM COMPANY OF AMERICA, 2101K Gulf Building, Pittsburgh 19, Pennsylvania.





ALCOA FIRST IN ALUMINUM

We Make Sure Before We Start

Here at Harrison, we have everything it takes to engineer and produce heat transfer units to meet the specific requirements of any Diesel application.

We have *design experience,* gained by correlating field results with laboratory test data covering both performance and structural strength.

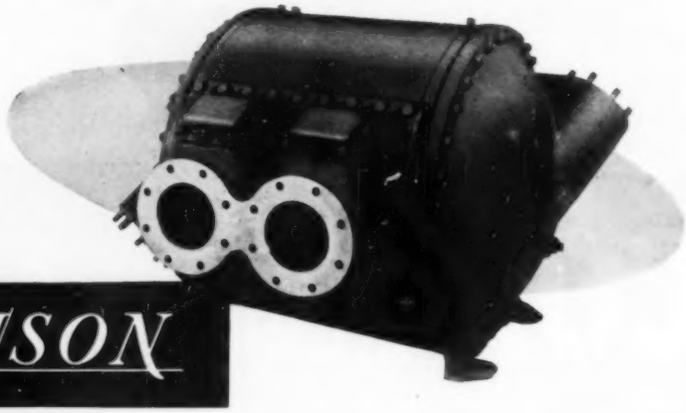
We have *sample-making* and *testing equipment* from which we can obtain full basic evaluation of any particular type of heat transfer unit, and determine its ability to meet rigorous field conditions.

We have ample *manufacturing facilities* for quality and quantity production at low cost.

We have a well organized *service group* to aid our customers in obtaining a broad and economical use of our products.

Manufacturers of Diesel engines are invited to avail themselves of our experience and facilities in seeking the solution of their cooling problems.

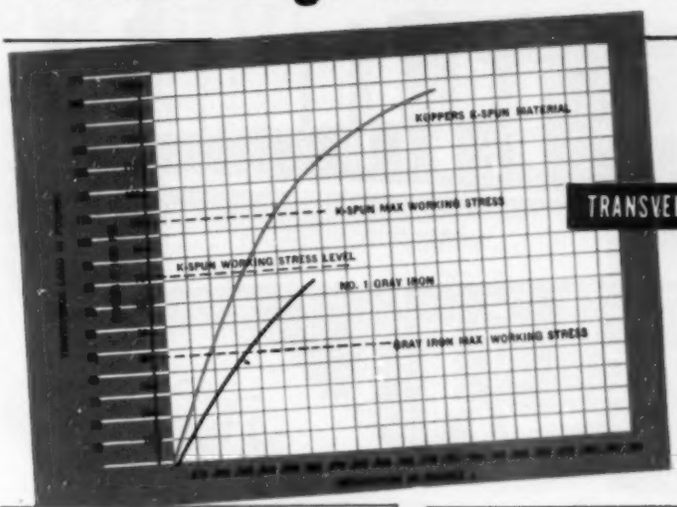
HARRISON HEAT TRANSFER UNITS



HARRISON

HARRISON RADIATOR DIVISION, GENERAL MOTORS CORPORATION, LOCKPORT, N.Y.

Here's PROOF that Koppers K-Spun Piston Rings are TWICE AS STRONG!



TRANSVERSE STRESS CHART

HERE ARE THE AMAZING RESULTS OF ACTUAL LABORATORY TESTS COMPARING ORDINARY GRAY IRON WITH KOPPERS K-SPUN, *THE MIRACLE METAL!*

Koppers K-Spun material shows a maximum working stress of 90,000 psi, compared with a maximum working stress of *only 40,000 psi for ordinary gray iron piston ring material!* Note the difference in the slopes of the two curves, due to K-Spun's increased modulus. K-Spun's yield point, though approaching ultimate strength, is low enough to allow a small percentage of elongation, resulting in toughness and impact value *many times greater* than that of ordinary gray iron.

TABLE 1—TRANSVERSE MODULUS AND RUPTURE STRESS

Koppers K-Spun Material			No. 1 Gray Iron		
TRANSVERSE MODULUS at			TRANSVERSE MODULUS at		
40,000 # psi	60,000 # psi	90,000 # psi	40,000 # psi	60,000 # psi	90,000 # psi
22.0×10^6	20.6×10^6	19.6×10^6	12.4×10^6	10.8×10^6	.....
RUPTURE STRESS psi			RUPTURE STRESS psi		
130,000			67,000		

TABLE 2—HARDNESS, IMPACT AND TENSILE STRENGTH

Koppers K-Spun Material			No. 1 Gray Iron		
Hardness Rc	Impact in lbs.	Tensile Stren., psi	Hardness Rc	Impact in lbs.	Tensile Stren., psi
100-103	9.5- 9.5	75,400	102-104	2.5-3.0	42,000
99-100	11.0-11.5	72,900	103-104	2.5-3.0	40,000
105-106	7.0- 5.0	76,000	101-103	3.0-3.0	41,000
99-102	7.5- 8.0	79,100	103-105	2.5-3.0	42,000
98-100	8.5-10.0	76,500	104-105	3.0-3.0	42,300
103-104	6.0- 7.0	77,500	102-103	3.0-3.5	38,000
101-102	7.0- 8.5	78,000	104-105	2.5-2.5	40,000

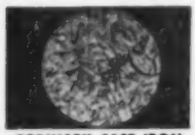
POROUS CHROME PISTON RINGS
. . . another Koppers Exclusive!

Koppers Porous Chrome Rings reduce cylinder wall wear 50% or more by actual test! Famous Van der Horst Plating Process provides a porous chrome surface that distributes oil for better lubrication during break-in, wears down to perfectly seated solid chrome that gives up to four times as much service between overhauls! For gasoline and Diesel engines (on specification).

KOPPERS

IF you've had experience with Koppers American Hammered Rings in Diesel, steam or gasoline engines, you already have *proof of performance* of their superiority . . . now read for yourself these scientific facts and figures, verified by exhaustive laboratory tests . . . *positive proof that K-Spun Rings are 100% stronger, 50% more elastic, four times more shock resistant than ordinary ring material!* They're *guaranteed* not to break in installation or in service! Get the facts on Koppers Piston Rings today . . . write for complete information to: KOPPERS CO., INC., *Piston Ring Dept.*, 1500 Hamburg Street, Baltimore 3, Maryland.

K-SPUN IS AN ENTIRELY NEW, STRONGER KIND OF CAST IRON



ORDINARY CAST IRON

KOPPERS K-SPUN

These microstructures, magnified 250 times, show the basic difference between ordinary cast iron and Koppers K-Spun. Top photo shows individually cast gray iron, containing spiral flake graphite with long stringers in a fine pearlitic matrix. This fine flake graphite imparts to the metal many planes of weakness, causing low resistance to combustion shock.

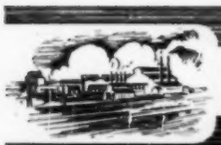
Bottom photo shows K-Spun, cast by an exclusive centrifugal process. Note large nodular type of graphite formation and absence of stringers. Large graphite nodules eliminate the many planes of weakness inherent in most cast iron . . . double impact resistance and elasticity . . . increases wear resistance by far . . . in amazing Koppers K-Spun Piston Rings!

KOPPERS *American Hammered* PISTON RINGS

from INGOT to finished CRANK

One Control
One Responsibility

CRANKS, connecting rods, drive shafts and steel castings from Erie Forge Company get the degree of watchful "follow-through" possible only under one control and one responsibility. Supervision of raw material selection, melting of steel, metallurgical control, engineering design and manufacturing craftsmanship team up perfectly to result in products which are superior. Superior because their record of performance in every kind of diesel engine service proves that it pays to insist on highest quality material and craftsmanship from Ingot to Finished Crank. Perhaps that accounts for the wide preference for the products of Erie Forge Company. Consult with Erie Engineers on your specification requirements. We can help you.



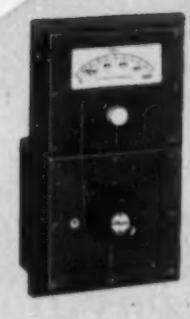
ERIE FORGE COMPANY, ERIE, PA.

Alnor Protection

EXTENDS THE LIFE LINE OF YOUR DIESEL

To assure continued high efficiency, every diesel should have the best protection against maladjustment and wear. Alnor Exhaust Pyrometers provide this protection by giving an instant check on all cylinders, anticipating trouble from preignition, detonation, overloading, or breakdown of lubrication, etc. Modern design and rugged construction assure accurate, reliable instrument service on any installation, large or small, even under severe operating conditions.

Such constant protection reduces maintenance time and expense to a minimum—increases efficiency and operating economy. Alnor Pyrometers are low cost, easy to install on old or new engines. Ask your Alnor Representative to assist you in selecting the right equipment from the full line of Alnor Exhaust Pyrometers and special thermocouples. Illinois Testing Laboratories, Inc., Room 508, 420 N. LaSalle St., Chicago 10, Illinois.

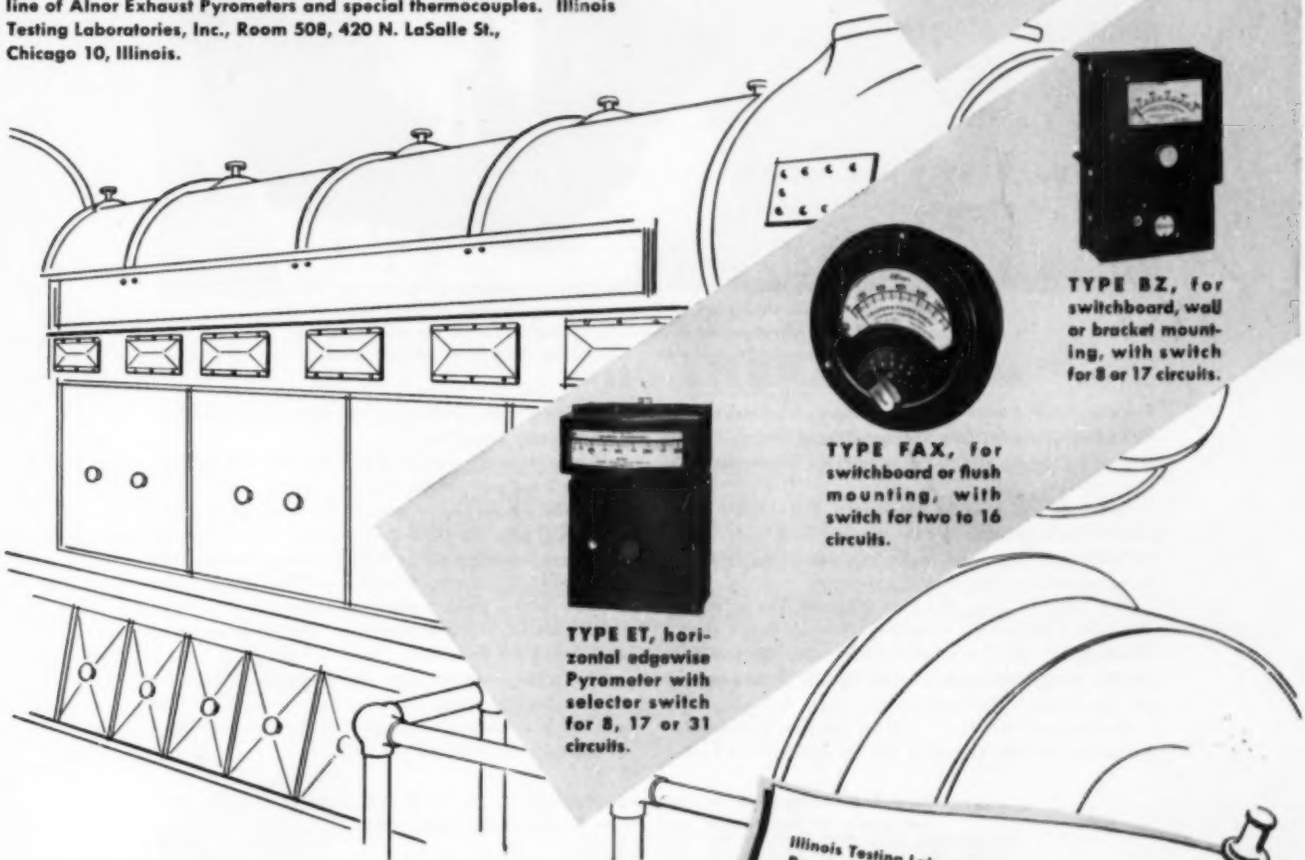


TYPE FRT, switchboard type flush or surface mounting with switch for 8, 17 or 31 circuits.

TYPE BZ, for switchboard, wall or bracket mounting, with switch for 8 or 17 circuits.

TYPE FAX, for switchboard or flush mounting, with switch for two to 16 circuits.

TYPE ET, horizontal edgewise Pyrometer with selector switch for 8, 17 or 31 circuits.



Send for Bulletin 4361, describing the complete Pyrometer line. Use this handy coupon.

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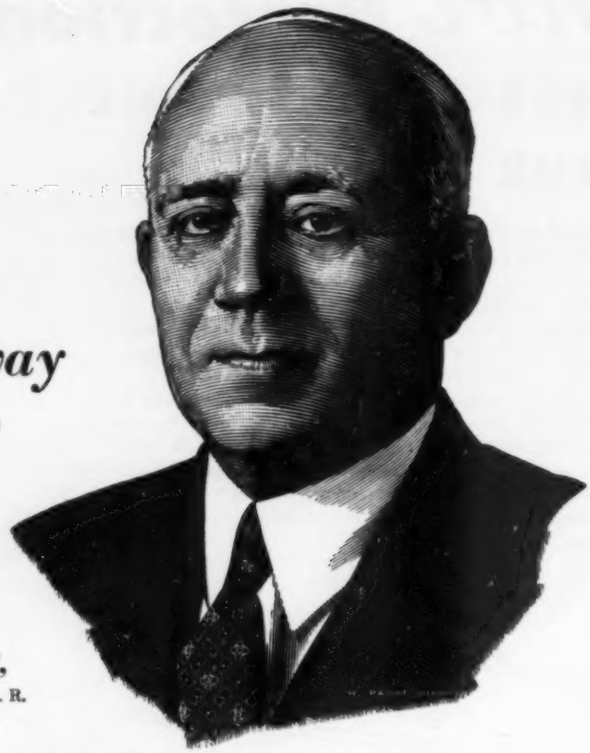

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Chairman of the Board, Pennsylvania R. R.

"The easiest way to buy bonds is through the payroll savings plan. We on the Pennsylvania believe in that plan. Labor and management, officers and employees, over half of us are enjoying it. We believe that it is good for our country, that it is good for our company, and that it is good for ourselves and our families to have these savings."

Top executives of more than 20,000 large companies share Mr. Clement's conviction that the Payroll Savings Plan is good for the country, the company, the employees and their families.

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And certainly it is good for the company. The employee who puts a part of his earnings in Savings Bonds *every month* is not the type of man whose name appears frequently on the absentee or accident records. Serious savers are serious—productive workers.

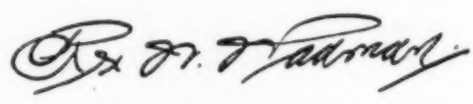
For the employee, the Payroll Savings Plan is a positive boon. It is the easy, automatic way for him to build financial independence, provide for the education of children or save money for a home.

If your company does not have a Payroll Savings Plan, here are two things you can do *today:*

Appoint a Bond Officer, one of your major executives—the kind of man who picks up a ball and runs with it. Tell him to get in touch with the State Director, Savings Bond Division, U. S. Treasury Department. The State Director is ready with a package plan—application cards, promotional material, practical suggestions, and all the personal assistance your Bond Officer may need.

Then make a note on your calendar to check the status of your Payroll Savings Plan six months from today—and you will be surprised and gratified at the high percentage of employee participation you will find.

The U. S. Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the G. M. Basford Company and



Editor — DIESEL PROGRESS

make it a

One-Piece Pipe Line

with SILBRAZ* joints

Silbraz joints, made with Walseal* valves, fittings and flanges, actually make a "one-piece pipe line" of brass, copper, or copper-nickel I.P.S. pipe or tubing . . . leaky joints are completely eliminated, and maintenance costs are reduced to the minimum.

A Silbraz joint is *silver-brazed* — not soldered. This modern pipe joint will not creep or pull apart under any condition which the pipe itself can withstand . . . vibration or corrosion will not affect it. A Silbraz joint is designed to have a tensile strength equal to about three times standard weight brass pipe, and the pipe will fail before the joint will pull apart.

For full information about Silbraz joints made with Walseal valves, fittings and flanges, see your nearby Walworth distributor, or write for Circular 84.

Patented — Reg. U. S. Patent Office

SEE OUR CATALOG IN SWEET'S

Make it a "one-piece pipe line" with Walseal

WALWORTH

valves and fittings

60 EAST 42nd STREET NEW YORK 17, N. Y.

chest x-rays for my employees? .. ridiculous

Not so ridiculous, mister! Chest X-rays may show that people who feel in the "pink" are really suffering from active tuberculosis. In its early stages TB frequently has no symptoms at all.

It now leads all other diseases as the cause of death between the ages of 15 and 34. Tuberculosis kills almost 50,000 Americans every year.

This is shameful . . . shameful because it is a disease that can be wiped out if we will all take the first simple step required to wipe it out . . . have a periodic chest X-ray.

Tuberculosis costs the United States 1,000,000 working years annually and, for TB Hospital maintenance alone, more than $1,000,000 in taxes. How could you make a better investment than to lend a hand in helping to rid the country of this scourge!

Post this page on your bulletin board. Let your employees know that the greatest safeguard against TB is excellent health. Active disease does not occur so long as the body's resistance can successfully fight the TB germ.

Let them know that TB is contagious. It is spread through sneezing, coughing and personal contacts.

Let them know that TB is curable, and that the sooner it is detected, the quicker the cure.

Let them know, above all else, they will be doing themselves a favor, their families and community by having their chests X-rayed at least once a year . . . starting TODAY!

Your cooperation can help save lives . . . maybe your own.

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Quiet Surroundings

with Noisy Engines and Compressors

Snub the Slug— and Stop the Noise

Disturbing noise from engine exhausts and compressor intakes is effectively reduced when Burgess-Manning Exhaust and Air Intake Snubbers are installed. Snubbers prevent noise by dissipating the energy in the exhaust gas slugs, and smoothing the flow of intake air, providing quiet operation without affecting performance. Burgess-Manning Snubbers can also be used to control gas surging and the harmful vibration of machinery and piping produced by such pulsations.

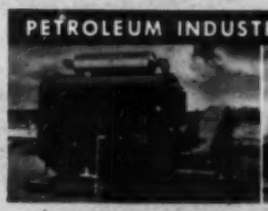
For solution of your noise problems, consult the Burgess-Manning engineers.

MANUFACTURING

Compressed Air System

Factory

PETROLEUM INDUSTRY

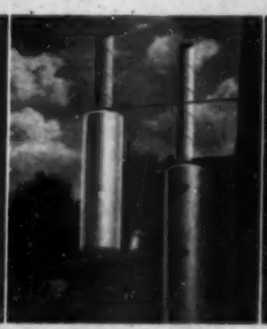


Pipe Line Engine

Compressor Station

UTILITIES

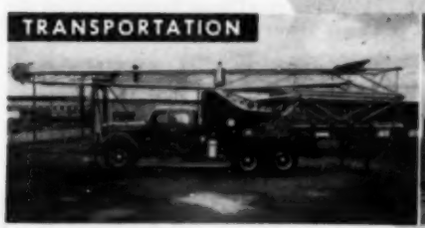
Electric Power Plant



Electric Power Plant

Municipal Water Plant

TRANSPORTATION



Portable Drilling Rig

Train

River Boat

BURGESS-MANNING COMPANY

LIBERTYVILLE, ILLINOIS

. . IN BUS POWER
This is the Diesel
that gave power users new ideas
. . IN CONSTRUCTION EQUIPMENT
. . IN MARINE POWER
. . IN PORTABLE POWER

SHOW an engineer a better source of power and things start happening fast.

That's illustrated by events since General Motors first introduced the "71" Series of two-, three-, four- and six-cylinder Diesel engines, ranging from 50 to 200 horsepower—little brothers of the famed two-cycle GM Diesels that drive so many crack American passenger and freight trains.

Bus engineers went for the "71" at first sight. They liked its compactness, its fuel economy, its clean-burning operation. Now more than 20,000 city and inter-city buses are powered by GM "71" Diesel engines.

Army and Navy engineers approved its rugged strength and dependability. During the war they used 182,000 GM "71" Diesels to operate landing craft, tanks, tractors, bulldozers and other military vehicles.

So, too, have designers of all types of power-driven equipment turned to the GM "71" for low-cost efficient power. Today they are using it in heavy-duty trucks, tractors and earth movers, in work and pleasure boats, in cotton gins, lumber mills, oil rigs and for many other mobile, portable and stationary uses—*with remarkably successful results!*

That is because the GM "71" is a two-cycle engine that delivers power on every piston downstroke—in contrast to most Diesels that deliver power only on every second downstroke. This makes GM Series 71 Diesels more compact, lighter, faster-accelerating, smoother, cleaner-burning—*and twelve years' experience in applications totaling over 46,000,000 horsepower proves it!*

The GM "71" gives you Diesel brawn without the bulk. *It is Diesel power at its best.*

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES . . . Up TO 275 H. P. **DETROIT 28, MICHIGAN** MULTIPLE UNITS . . . Up TO 800 H. P.

GENERAL MOTORS

Only GM Diesels provide all these advantages

Smaller size, less weight per horsepower • Two-cycle smoothness, power on every downstroke • Quick starting, on its own fuel • Unit injectors—no high-pressure fuel lines • Rapid acceleration • Cleaner burning • Better high-altitude performance • Easy accessibility

GM GENERAL MOTORS DIESEL POWER

"Your Key to Power Economy"

DIESEL and GAS ENGINE PROGRESS

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EDITORIAL AND PRODUCTION OFFICES

816 N. La Cienega Blvd. — Los Angeles 46, Calif.

BUSINESS OFFICES

NEW YORK 19:
Robert N. Young
2 West 45th Street
MUrray Hill 2-7333

LOS ANGELES 46:
Alfred A. DeCicco
816 N. La Cienega Blvd.
BRadshaw 2-6273

LONDON E.C. 4:
E. H. Doddrell
342 St. Paul's Corner
Ludgate Hill

TULSA 3:
O. F. Cozier
515 McBirney Bldg.
4-5555

NBP INCORPORATED

Member National Business Publications, Inc. and Controlled Circulation Audit, Inc.

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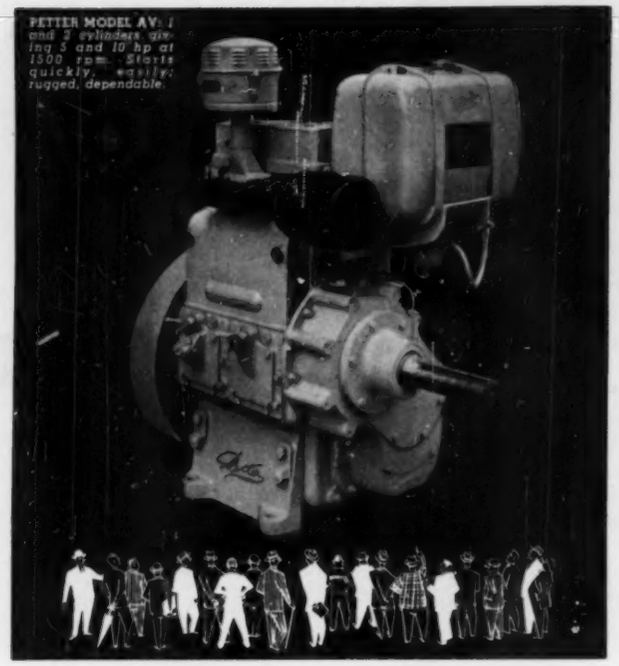
DIESEL PROGRESS for October, 1950, Vol. XVI, No. 10. Published monthly by Diesel Engines, Inc., 816 N. La Cienega Blvd., Los Angeles 46, California. Tel. BRadshaw 2-6273. Subscription rates are $5.00 for U.S.A. and possessions. All other countries $7.50 per year. Subscriptions may be paid the London office at £2-12s-6d per year.

DIESEL PROGRESS is indexed regularly by Engineering Index, Inc.

FRONT COVER ILLUSTRATION



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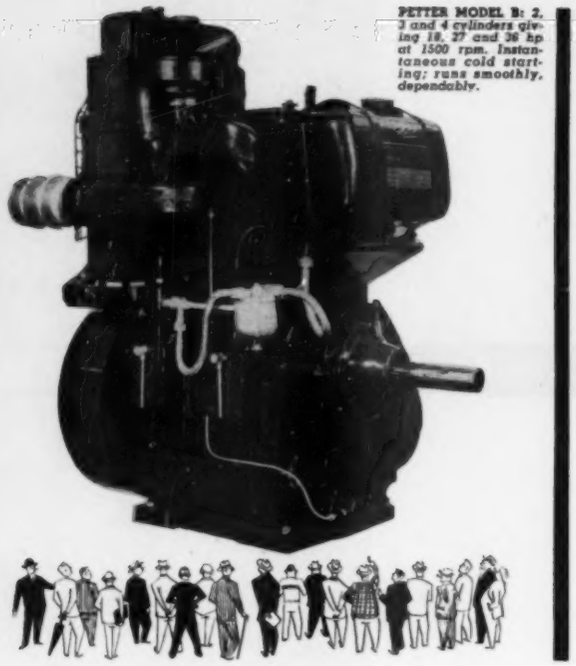

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Southwestern Federated Power Cooperative, Creston, Iowa—Three 1495 kva., 360 rpm. Enterprise diesels driving Electric Machinery generators.

MORE internal combustion horsepower is being installed in REA plants in 1950 than in any single year in the 15-year history of the Federal agency. This is the paramount fact that emerges from a survey of the REA development program. Moreover, this high level of expansion in the use of diesel and dual-fuel engines is expected to continue in the years ahead. As of July, 1950, projects under construction total an unprecedented 78,230 kilowatts, of which it is estimated that 55,000 kw. will be in operation this year. Fourteen new plants are being built with 33 engines totaling 49,700 kw. and another 30 engines totaling 28,530 kw. are being added to 22 existing plants.

These facts are somewhat obscured in the over-all statistics that emanate from Washington by the truly vast expansion in large central steam power stations and in purchased hydro-electric power. The truth is that the Rural Electrification Administration, for all of its accomplishments in the first dozen years of its existence, has only hit full stride in the past three years. We are now observing a tremendous growth in which all the major types of prime movers are playing a part. Percentage-wise, internal combustion engines are filling a smaller part of the total need than in years past, but it remains true that in actual horsepower that part is greater than ever before.

Table I shows the annual growth in internal combustion kilowatt capacity from 1938, when the first units went into operation through 1950 for which an official estimate is given. It will be seen that development proceeded at a good pace until brought to a virtual standstill by the war, then moved forward rapidly in post-war years. By the close of 1947, the capacity of engines in operation totaled 116,820 kilowatts. Then followed the three big years: 54,203 kw. installed in 1948, 52,022 kw. in 1949, and an estimated 55,000 kw. in 1950. This means a three-year expansion of 138 per cent, bringing installed capacity to 278,045 kw.

REA is growing fast in every way. More than a million miles of transmission line have been built and energized, bringing electric power to 3,200,000 rural consumers. In 15 years, loans totaling more than $2,100,000,000 have been made to 1,067 local groups, including 977 farmer-owned cooperatives, 41 public power districts, 24 other public bodies, and 25 private power companies. REA Administrator Claude R. Wickard estimates that 85 per cent of the nation's farms now receive central station electric service as compared to 11 per cent when the REA program was initiated in 1935. Kilowatt-hours generated are near a billion a year with another six billion kwh. purchased.

There are two major factors in the growth of power consumption: First, the physical expansion of facilities is reaching more and more consumers. Second, the consumption per consumer is rising steadily. The national average of power used on REA-financed lines in December, 1949, was 141 kw. hr. per farm, nearly 250 per cent above the average in December, 1941. The evidence points to continued growth. There are 900,000 farms still without electricity. The fact that many farms in areas where power is available at low cost far exceed the national consumption average indicates that the average can be raised substantially.

Recent major policy decisions are determining how this expanding demand shall be met. They appear to be changing drastically the pattern of REA development. Initially, the REA cooperative

TABLE II

Generating Capacity Financed by REA
Cumulative Totals by Year
(Kw. Capacity in Operation)

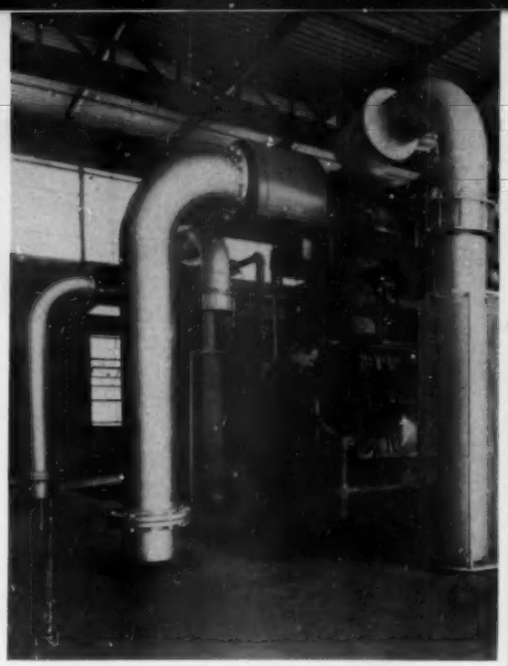
Year	*Internal Combustion*	*Hydro*	*Steam*	*Total*
1938	10,292	250	0	10,542
1939	15,023	370	0	15,393
1940	24,730	1,075	6,000	31,805
1941	40,902	1,575	6,000	48,477
1942	54,417	2,650	6,000	63,067
1943	56,473	12,200	6,000	74,693
1944	57,259	14,630	10,000	81,889
1945	61,703	16,370	12,730	90,803
1946	90,041	17,862	16,375	124,278
1947	116,820	17,977	48,985	183,782
1948	171,023	20,073	48,985	240,081
1949	223,195	21,883	57,420	302,498

Table compiled by REA.

TABLE III

Internal Combustion Plants Under Construction as of July, 1950

Cooperative	*Plant Site*	*Diesel or Dual-Fuel*	*KW*	
Bridger Valley Electric Assn., Inc. Mountain View, Wyoming	Lyman	D-F	Two 500 kw.	Addition
Caney Valley Electric Cooperative Assn., Inc. Cedar Vale, Kansas	Sedan	D-F	One 1100 kw.	Addition
Cape Hatteras Electric Membership Corp. Buxton, North Carolina	Buxton	D	One 200 kw.	Addition
Central New Mexico Electric Coop., Inc.	Willard	D	One 1000 kw.	Addition
		D	One 575 kw.	Addition
Chesapeake Island Electric Cooperative Tangier, Virginia	Tangier Island	D	One 200 kw.	Addition
Chugach Electric Association Anchorage, Alaska	Anchorage	D	Two 600 kw.	New plant
		D	One 500 kw.	New plant
Clay Electric Cooperative, Inc. Keystone Heights, Florida	Worthington Springs	D	Two 1100 kw.	Addition
Dairyland Power Cooperative La Crosse, Wisconsin	Twin Lake	D-F	Two 2700 kw.	Addition
Federated Rural Electric Association Jackson, Minnesota	Jackson	D-F	Three 1250 kw.	New plant
Florida Keys Electric Cooperative Assn., Inc. Tavernier, Florida	Tavernier	D	One 1100 kw.	Addition
Homer Electric Association Homer, Alaska	Homer	D	Two 125 kw.	New plant
		D	Two 250 kw.	New plant
Jamez Mountains Electric Cooperative Espanola, New Mexico	Espanola	D-F	Two 2500 kw.	New plant
KAMO Electric Cooperative, Inc. Vinita, Oklahoma	Fairfax	D	One 1000 kw.	Addition
Kit Carson Electric Cooperative, Inc. Taos, New Mexico	Taos	D	One 1000 kw.	Addition
Lea County Electric Cooperative Lovington, New Mexico	Lovington	D-F	Three 1100 kw.	Addition
		D-F	One 2500 kw.	Addition
M & A Electric Power Cooperative Poplar Bluff, Missouri	Poplar Bluff	D-F	Four 2500 kw.	New plant
Northern Michigan Electric Coop., Inc.	Beaver Island	D	One 75 kw.	Addition
	Tower	D	One 1100 kw.	Addition
Northeast Missouri Electric Power Coop. Palmyra, Missouri	South River	D-F	Three 2500 kw.	New plant
Rural Cooperative Power Association Maple Lake, Minnesota	Milaca	D	Two 1250 kw.	New plant
South Texas Electric Cooperative, Inc. La Ward, Texas	Bay City	D-F	Five 750 kw.	New plant
Southwest Electric Membership Corp. Palisade, Nebraska	Palisade	D	One 330 kw.	Addition
Swan's Island Electric Cooperative Swan's Island, Maine	Mintura	D	Two 100 kw.	New plant
Thumb Electric Cooperative of Michigan Ubly, Michigan	Caro	D	One 1100 kw.	Addition
Washington Island Electric Coop., Inc. Washington Island, Wisconsin	Washington Island	D	One 200 kw.	Addition
Western Electric Cooperative, Inc. Hollis, Oklahoma	Woodward	D-F	Three 1100 kw.	New plant
Western Minnesota Power Cooperative Benson, Minnesota	Benson	D	Two 1100 kw.	Addition
Wheatland Electric Cooperative Scott City, Kansas	Scott City	D-F	Two 2500 kw.	New plant
Wolverine Electric Cooperative	Portland	D	One 1100 kw.	Addition
Big Rapids, Michigan	Burnips	D-F	One 600 kw.	Addition
	Hersey	D-F	Three 2500 kw.	Addition

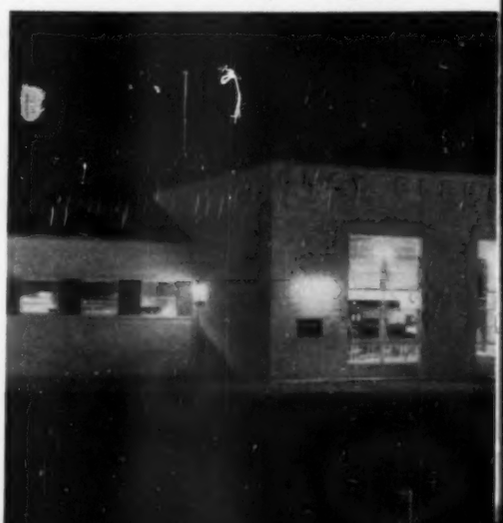


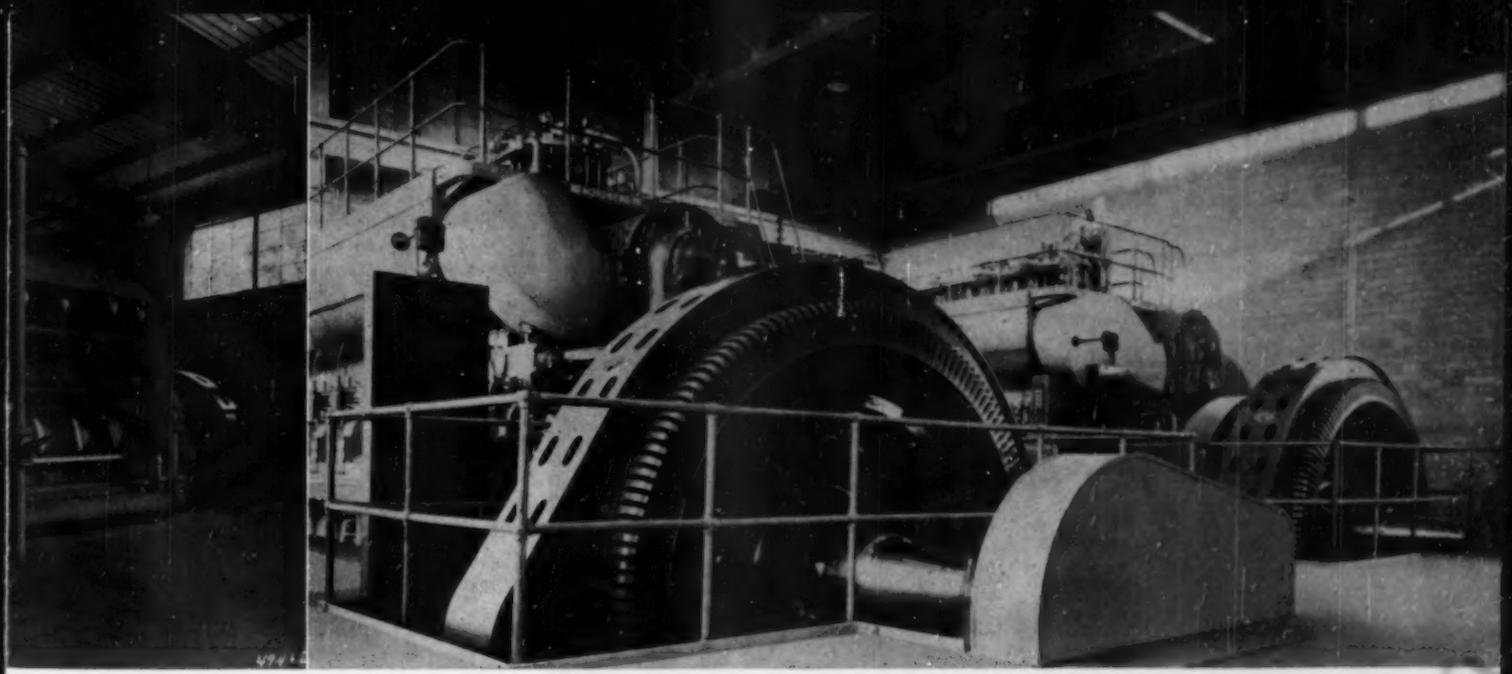
City of Elk River diesel plant, Elk River, Minn.—two 688 kva., 360 rpm. Worthington diesels driving Electric Machinery generators.

was a relatively small unit which was served most efficiently and economically by a small diesel generating plant. As the co-ops grew, plants became larger and in many cases separate generating stations were spotted along the far-flung transmission lines of a single co-op, but still the diesel was the logical prime mover. Thus, by the end of 1949, internal combustion engines accounted for 223,195 kw., or 73.8 per cent of total capacity, steam for 57,420 kw., or 19 per cent, and hydro for 21,883 kw., or 7.2 per cent. Table II gives the comparative figures for 1938 through 1949.

We are now witnessing a new phenomenon, the formation of huge federations of cooperatives. These federations are formed primarily to take advantage of the economies of large-volume power production. Some have arranged to secure their power from the great hydro-electric developments of the Federal government. Some of this group are erecting large generating plants for standby service and to firm up the hydro power supply. Other federations plan to produce all their own power and are building big central stations. These

Clay Electric Cooperative, Inc., Keystone Heights, Florida.





Dairyland Power Cooperative, Baldwin, Wisconsin—two 3125 kva., 225 rpm. Nordberg diesels driving Electric Machinery generators.

central stations have capacities as high as 40,000 kw. and in that size class, steam has been the choice. At the start of 1950, steam plants totaling 144,000 kw. were under construction with another 260,500 kw. approved for loans.

How far the federation system will be carried depends on many complex factors with both political and engineering aspects. The river control programs now being carried out or planned by the Army Engineers, the projects of the Bureau of Reclamation, the possible creation of additional autonomous river authorities, all will affect the availability of cheap hydro power. If hydro power becomes available, there is no doubt that many REA cooperatives will band together to tap these sources of low-cost energy. Even if hydro facilities are provided, the plans of the co-ops will be seriously influenced by government policy on auxiliary power supply. Recently there has been a bitter fight in Congress over the proposal to authorize TVA to build steam plants to firm up hydro power. If these plants are not built in conjunction with hydro developments, it will be incumbent on the co-ops to provide their own standby protection.

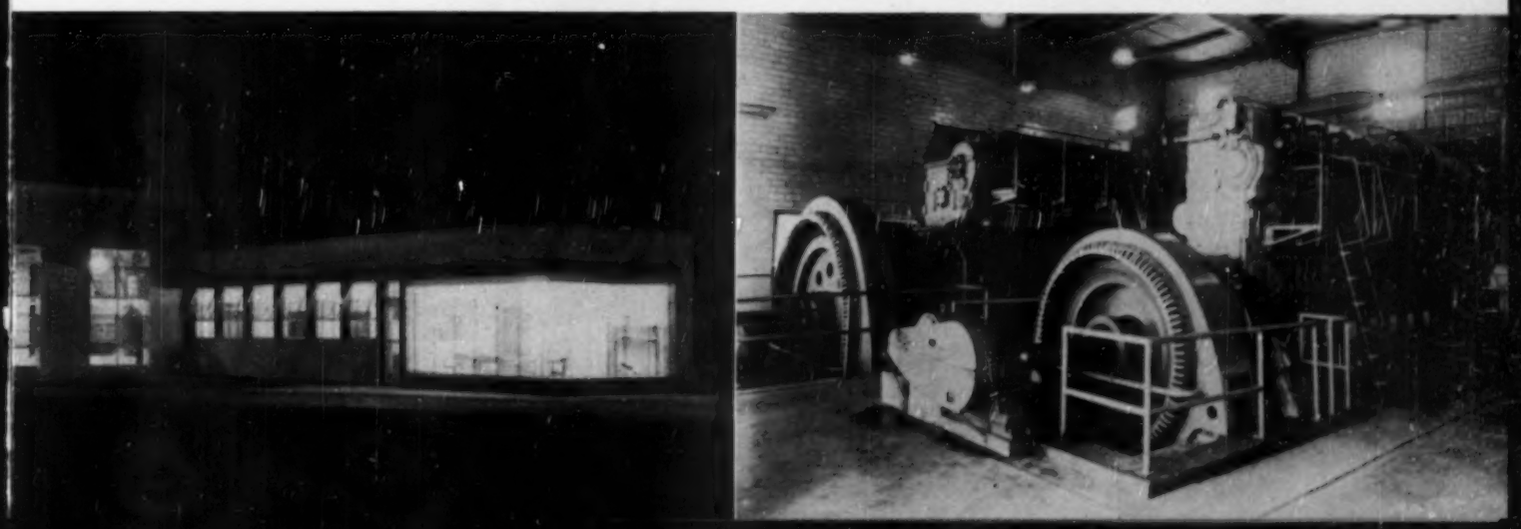
Critics of the federation system protest that it violates the spirit and intent of the original program, that it was never the intention of Congress to finance large power combines. Proponents reply that it is only logical to seek the most efficient and economical means of providing electric power for rural America. For the present, there is no doubt that federations are being encouraged and will thrive in the favorable political climate. What the future may bring is never certain in a democracy where policy is controlled at the polls.

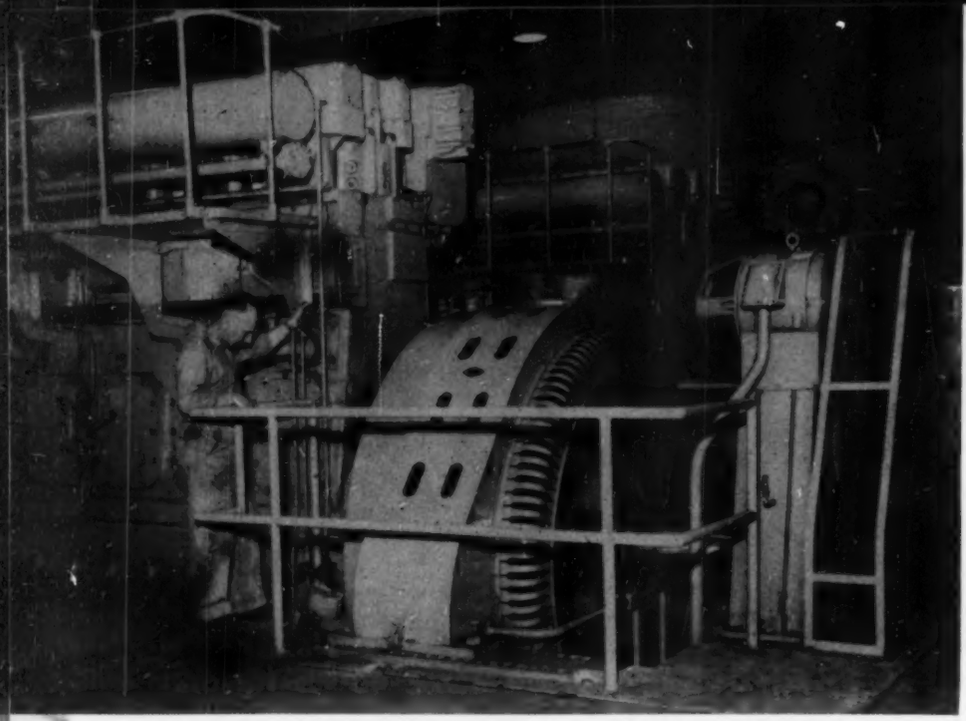
In any event, engineering considerations will carry proper weight in any determinations of policy. One argument against the federation is that it serves to augment the danger of service interruption through line failure, a danger to which the REA co-op was already inherently susceptible. Some REA officials, interviewed in Washington, envisioned a system in which each hydro station would be supplemented with a network of internal combustion plants strategically located along the lines. These auxiliary plants would firm up hydro power, pick up the voltage, and insure continuity of service. It is felt in some authoritative quarters that this is a probable pattern of development and will provide a large market for diesel and dual-fuel engines in the next decade.

REA is not immune to other influences affecting the general use of internal combustion engines. Improved efficiency and the ability to use cheaper fuels alter the competitive picture and promote the use of internal combustion, whether in municipal, industrial or REA plants. The development of dual-fuel engines with their utilization of cheap natural gas has been of major importance. As a general rule, REA engineers feel they can now go up to 15,000 kw. capacity in a dual-fuel plant and retain competitive advantage of a steam plant of equal capacity. As of July, 1950, of the 78,250 kw. of internal combustion plants actually under construction, 49,700 kw. was dual-fuel.

One responsible official felt that only the limited availability of gas prevented much more extensive use of dual-fuel engines. He felt that many of the gas and gas pipe line companies do not yet appreciate the advantages to them of the dual-fuel power plant. REA has found some companies reluctant to contract for the necessary gas supply and some unwilling to make reasonable rate concessions. This is an educational problem which undoubtedly will be solved in the near future, for certainly the dual-fuel plant provides an ideal load for the gas supplier. It uses large quantities

Corn Belt Power Cooperative, Pocahontas, Iowa—one National Superior diesel driving Elliott 1,000 kw., 360 rpm. generator; one Lima-Hamilton diesel driving an Elliott 1,600 kw., 240 rpm. generator.





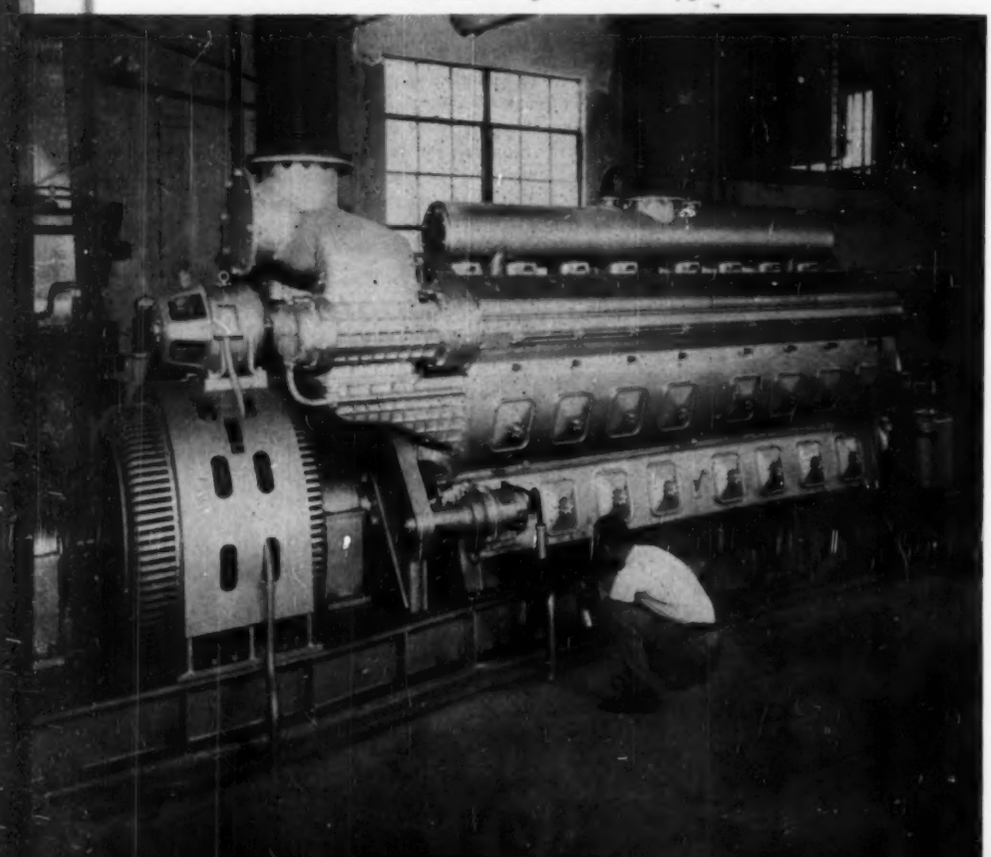
Western Minnesota Power Cooperative, Benson, Minn.—three 1,332 kva., 327 rpm. Electric Machinery generators driven by Cooper-Bessemer diesel engines.

throughout the summer months when other demand is low, yet can be cut off instantly in winter if the gas system becomes overloaded. The power plant, of course, switches automatically to full diesel operation. With gas pipe lines pushing thousands of miles across the nation, dual-fuel expansion seems inevitable.

Another significant development has been the increasing use of heavier, cheaper oils as diesel fuel. Many plants are operating successfully with Bunker C oil. The REA plant at Keystone Heights, Florida, is reported to be using an even heavier crude oil which it obtains at a price of $1.55 a barrel. Obviously, the possibility of using a cheaper fuel oil makes diesels look more attractive in any study of comparative power costs.

Concomitant with the acceptance of larger internal combustion plants has been the trend toward larger individual engines. At the start of 1950 there were in operation 443 engines under 600 kw., 131 engines between 600 and 1,300 kw., and only 12 units between 1,300 and 2,700 kw., the largest class. In contrast, the July, 1950, list of plants under construction includes two engines rated at 2,700 kw. and 15 engines rated at 2,500 kw., accounting for more than 54 per cent of the total kilowatt capacity under construction. In moving into the larger sizes, REA is restricted by the legal requirement that there be at least three bidders on each job. Further, it is felt that the most favorable competitive bidding is found below 2,700 kilowatts.

Ottertail Power Company, Britton, South Dakota—1,250 kva., 720 rpm. General Motors diesel driving Electric Machinery generator.



Meanwhile, REA-financed diesel and dual-fuel plants continue to grow at an unprecedented rate. Many existing plants are adding units in 1950. For example, a plant at Hersey, Michigan, which previously had an installed capacity of 2,800 kw., is putting in an additional 7,500 kw. in dual-fuel engines. Many entirely new plants are in operation, under construction, or in the planning stage. A new 3,300 kw. dual-fuel plant is going into service in mid-year at Woodward, Oklahoma. A 10,000 kw. plant is under construction at Poplar Bluff, Missouri. A 5,000 kw. plant is proposed for Espanola, New Mexico, and a 1,050 kw. plant is planned for Dillingham, Alaska. These are typical of the extensive current activities of the REA internal combustion division. Table III gives a complete list of the internal combustion plants under construction as of July, 1950.

Diesels are not alone in the REA power production picture as they were just a short time ago. Their expansion prospects and the precise role they will play cannot at this moment be determined with any degree of certainty. But some facts are incontrovertible: Diesels and dual-fuel engines are expanding the horsepower range in which their economic superiority is recognized. Diesels and dual-fuel engines are being installed this year in larger volume than in any other year in REA history. Whatever the political developments or the trends in cooperative federation, diesels and dual-fuel engines will continue in the forseeable future to play a major part in the provision of power for rural electrification.

TABLE I

Generating Capacities in Operation by REA Borrowers Using Internal Combustion Units as Prime Movers

Year	*Total in Operation* KW	*Annual Increase* KW
1938	10,293	
1939	15,023	4,730
1940	24,730	9,707
1941	40,920	16,190
1942	54,417	13,497
1943	56,473	2,056
1944	57,259	786
1945	61,703	4,444
1946	90,041	28,338
1947	116,820	26,779
1948	171,023	54,203
1949	223,195	52,022
1950	278,045	55,000*

Table compiled by REA. *Estimated.

ESSO COMMISSIONS NEW DIESEL ELECTRIC TUG

THE Esso house flag was raised on the new diesel-electric tug, named *Esso Tug No. 9*, when the vessel was commissioned on July 7, at Pier 90, North River, New York. Participating in the ceremonies (left to right) were Stanley C. Hope, Esso president (in dark suit under flag); H. Janney Nichols, Jr., director; Dr. H. G. Burks, Jr., executive vice president; and (extreme right) R. G. Kimball, manager, Inland Waterways Division. Powered by a 1,000 shaft horsepower General Motors diesel electric drive, *Esso Tug No. 9* has a speed of 13 knots and is 192 gross tons. It is 103 feet over-all, has a 25-foot beam, and draws approximately 10½ feet. *Esso Tug No. 9* will augment Inland Waterways' present fleet of seven tugs in the docking and undocking of ocean-going tankers and moving oil barges in the port of New York. The vessel is fitted with the latest devices for safety and efficiency, including a radio-telephone system, direction finder, and radar. She was built by the Gulfport Shipbuilding and Drydock Company, Port Arthur, Texas, was designed by Tams, Inc., of New York, for the Cleveland Diesel Engine Division of General Motors.

"A-C" POWER IN KERN COUNTY

San Joaquin Tractor Co. Moves to Modern Sales-Service Home in Balanced Farm-Industrial Empire of Oil, Cotton, Early Potatoes

By F. HAL HIGGINS

KERN County, California, is one of those spectacular desert-to-diamonds spots on the west coast map. Its rise to wealth and power was assured from its first oil gusher and oil still tops the county's annual wealth production with $170,000,000 in "black gold" to a mere $160,000,000 from agriculture. But Kern's agriculture in early potatoes and cotton lead the United States, just as does its oil. Hence, farm equipment dealers in Kern County have a nicely balanced industrial-agricultural empire to serve, and such service has made them big, highly specialized, ingenious and prosperous. A blacksmith named Karpe jumped from anvil to millions via his farm equipment dealership before the war. Another dealership is the San Joaquin Tractor Co., which has moved into its fine, modern home on Highway 99, just as you start south out of Bakersfield. Teamed up in the partnership back of this name are Louis Agnetti, president, and Sam Tobias, vice president and general manager. The pictures tell you what their new place looks like. Their brief announcement on opening to their industrial and agricultural customers and prospects said: "The same folks; new location in a new building under a new name. In striving to give you the best sales, service, and display facilities, we have completed the most modern tractor plant in the valley. It incorporates the newest architectural design and landscaping on a location affording maximum convenience to you when approaching from any direction. Plenty of room for parking. Complete Allis-Chalmers lines are constantly on display. Full stocks of parts, accessories and the entire allied equipment group are available. Literature, specifications, catalogs, manuals, and instructions books can be obtained at any time through our new office. Remember, we are the same folks you know so well, at a new location, in a new building, under a new name—San Joaquin Tractor Co. —at the junction of Highway 99 and California Avenue. Come in and see us today. We want you to inspect our new home, especially designed to give you the best in sales and service."

Your Old Reporter has watched Kern emerge from a bustling oil capital at Bakersfield with its late winter wildflower vistas stretching across the virgin cow pastures to splash up the hills and mountains south, east ,and west. Its tractor farming history is deep and colorful, going back to the first farming developments in the early '70's when Senator Carr, Haggin, of race horse and gold mine fame, and associates poured a barrel of their new gold into the first farming developments in this area. Carr induced Col. Oliver Hyde, engineer for the Tide Lands Reclamation Co. of San Francisco, to send down one of his rubber-shod three-wheel steam tractors that Aetna Iron Works had built for Hyde to improve on the imported Scotch Thomson the reclamation company had bought. Carr bought one of these steam tractors and used it for reclamation, ditching, freighting, plowing, etc., for some years. There wasn't much of a gap in Kern County's tractor history from then on till the Best and Holt wheeled steamers began coming down from San Leandro and Stockton at the end of the '80's and early '90's. But the steam tractors never got numerous in Kern County agriculture.

HD19's in the Cuyama oil fields over in the Cuyama Valley on the road between Taft and the Pacific Coast. Many oilfield development firms find big crawler diesel tractors the "first weapon of offense" in getting their equipment and supplies into the area being opened up for drilling.

The gasoline tractor arrived before World War I, however, and the area picked up a bit with the war boom in food production. By the time the writer got out to California his second time in 1927, Kern County and Bakersfield meant OIL.

True, over to the northwest of the oil capital, about 15 to 20 miles, was a green spot in the dull shimmering semi-desert. This was the Hoover ranch, where an engineer of world rating and associates with vision and money were venturing their capital on an agricultural future for Kern County. It looked like a long shot to the outsider who glanced off at the horizon and saw oil derricks

Night brings out beauty of new plant of San Joaquin Tractor Co., out on Highway 99, where California Avenue intersects it in one of the most strategic spots in Southern California.

of grass-root farm machinery development in specialized areas where the local men reflect the demands of a particular buyer who knows what he wants and will pay for it.

Oil in both producing and refining fields dominates the Kern County industrial picture so completely that one never gets out of sight of derricks in this county. Nor does he get out of the oil field atmosphere and tempo of big rugged men and operations that buy and use a lot of power of all kinds. Also, they have their choice of all types of fuel—butane, gasoline, crude oil as it comes from their wells, natural gas, diesel, steam and electric. So, to get a concise picture, let's look at the Kern County Chamber of Commerce summary of the petroleum industry's place in this important area: "Petroleum, Kern County . . . produced more than one-third of the total California petroleum output. Oil constitutes one of Kern County's chief sources of wealth and income. The industry's dollar-volume returns annually vie with the county's huge agricultural enterprises. In many areas, towering steel derricks just out of expansive crop acreages. So while fertile farm lands are producing a multi-million-dollar potato crop, lying beneath the soil are bountiful supplies of oil and gas.

Small independent producers, and large corporations alike have exploited the rich oil-and-gas-bearing formations of Kern County since the turn of the century. Two soldiers discovered the first asphalt beds in 1854 near Reward, in western Kern County, and in 1863 several thousand barrels of oil were produced near Buena Vista Lake. In 1867, the Pacific Exploration Company drilled a well near Devil's Den with a crude, rotary auger.

It was not until 1899, however, that extensive oil deposits were discovered in what now is the famous Kern River Field. Activity spread to the West Side, and Taft soon became the capital of the oil empire of Kern. In 1910, the Lakeview Gusher "blew in," flooded the world's markets with oil, and boomed Kern County. Kern is the pioneer of deep oil wells, and has a large number of the deepest

Pair of HD19's at work on an oil field project over in the new development in Cuyama Valley in the roadless interior of California west of Bakersfield.

signalling "black gold" for lucky long shot players. But time, wars, depressions and population marched along, and it comes up 1950 with an invitation from Sales Manager George Baumgardt of San Joaquin Tractor Co. to come down and see Kern County and its Allis-Chalmers powering as he and his organization has equipped it. George sent his new industrial sales engineer over to meet the visitor and we rolled up 99 from Tulare to Shafter, stopping to look at an HD10 pulling a two-row Isaac potato digger. The improved Isaac, now built in a shop on the edge of Shafter, is something to see. One man rides the digger to raise or lower the digging points to get all the potatoes that roll out in record yields that have lifted Kern County to United States leadership with an average 368 bushels per acre in 1947. The Isaac digger in two-row size seems to be the favorite, though another digger from the Edison Welding Shop has considerable following. It's the old California story

producing wells in the world, reaching depths of over 15,000 feet . . . nearly three miles. Almost every conceivable kind of oil field and related machinery make Kern County a mecca for foreign visitors, the oil geologist or engineer. From Egypt, Persia, Borneo, South America and other foreign lands have come oil technologists to study Kern County oil-producing techniques. A variety of geological conditions makes common the initiation of new practices in the oil fields of Kern County.

During World War II, Kern's oil wells and refineries supplied 100-octane gasoline for the nation's war machine. The renowned Midway-Sunset Field (including Buena Vista and Elk Hills) on Kern's West Side, has supplied about half the county's entire oil production in the past half century. The largest military reservoir in the country, 300,000,000 barrels of recoverable oil reserve, is contained in rich Elk Hills, which has been converted into a gigantic controlled laboratory. The newly-discovered reserves would give the nation 71,000 barrels a day in the event of an emergency. In Cuyama Valley, near Maricopa and Taft, the state's richest oil strike in a quarter of a century has added impetus to petroleum activities in Kern's West Side. The Cuyama field, it is predicted, will become the largest in the state."

A swing back to Bakersfield with a look at HD7s and HD10s disking potato fields following harvest, plowing an irrigation furrow along the border of a field, powering a sprinkler system, etc. "I want to see that USDA Shafter Cotton Station," the visitor insisted as we left Bakersfield in the morning after an inspection of the new home of San Joaquin Tractor Co. Your Old Reporter used to drive past this USDA station two or three miles down the road from Shafter in his trips through Kern County. But a sight of Jim Fairbank, K. O. Smith and a couple of Essick engineers horsing around with a strange looking self-propelled high clearance sprayer over west of Fresno three years ago, plus Jim's cotton papers at the annual farm machine conferences the past two years, had the visitor now eager to see the USDA cotton work here. Prof. Harvey, from U. C. Agronomy, and K. O. Smith, of USDA, were just taking out a Farmall tractor with special pressure spraying equipment on it for some tests and trials in the cotton fields. And as we left, a station worker on another Farmall called attention to the fact that this was one of their IH cotton picker tractors sans its picking equipment and basket and now cultivating as it worked forward instead of backwards as in its picking operations. Unfortunately, we did not attend the recent cotton growers' day when visitors inspected seven or eight different mechanical choppers that were fitted onto wheel tractors. These were all now dismantled or shipped back to the factories that loaned them for the demonstration, said K. O. Smith.

On to Wasco and a swing around looking for some of the Allis-Chalmers All-Crop combines, one of which was in this area. Between looks at tractors, we checked on two of the popular A-C motor graders not only being used by State, County and City governments, but also by oil companies, real estate development firms, custom operators and

City of Shafter's Allis-Chalmers Diesel (GM) motor grader caught at work improving its streets.

ranchers. Both Shafter and Wasco had one each at work improving their streets. West of Shafter we encountered an HD19 and an HD14 on the garbage dump five miles out. Garbage in this high temperature area must be handled so as to prevent its becoming a nuisance. Hence, the two big custom tractors rented by the City of Shafter were doing a "cat act" by digging a big hole and burying the problem. Pulling a 12-yard LeTourneau carryall scraper, the bigger tractor was rapidly digging a trench 150 yards long, 20 feet deep and 30 feet wide in which to drop the accumulated piles of tin cans, etc., before the smaller tractor covered them with the dirt excavated by the big tractor. There are a lot of HD19s in the territory, oil companies, contractors and Government all owning the big sizes.

The lines handled by San Joaquin Tractor Co. now are: Allis-Chalmers tractors and full line hydro-carrier and deep tillage tools; Be-Ge, Drott, Wooldridge, Kay-Brunner and Tractomotive dirt moving equipment; Koehring draglines and power shovels; Ingersoll-Rand compressors; Carco logging equipment; Gorman-Rupp pumps; Federal trucks; Pacific Wire rope; Gar-Wood and Baker dump trucks and bulldozers; Delano gypsum applicators.

San Joaquin Tractor Co. service men check an Allis-Chalmers HD19 tractor at a contractor's loading platform as he gets ready to move it 20 miles for a job of garbage disposal for the City of Shafter. This big tractor has the GM diesel engine and torque converter. Owned by Meadow Construction Co., Bakersfield, specializing in road work, excavating, etc.

RURAL POWER PROGRAM AIDED BY GAS DIESEL ENGINES

By W. J. GRANBERG

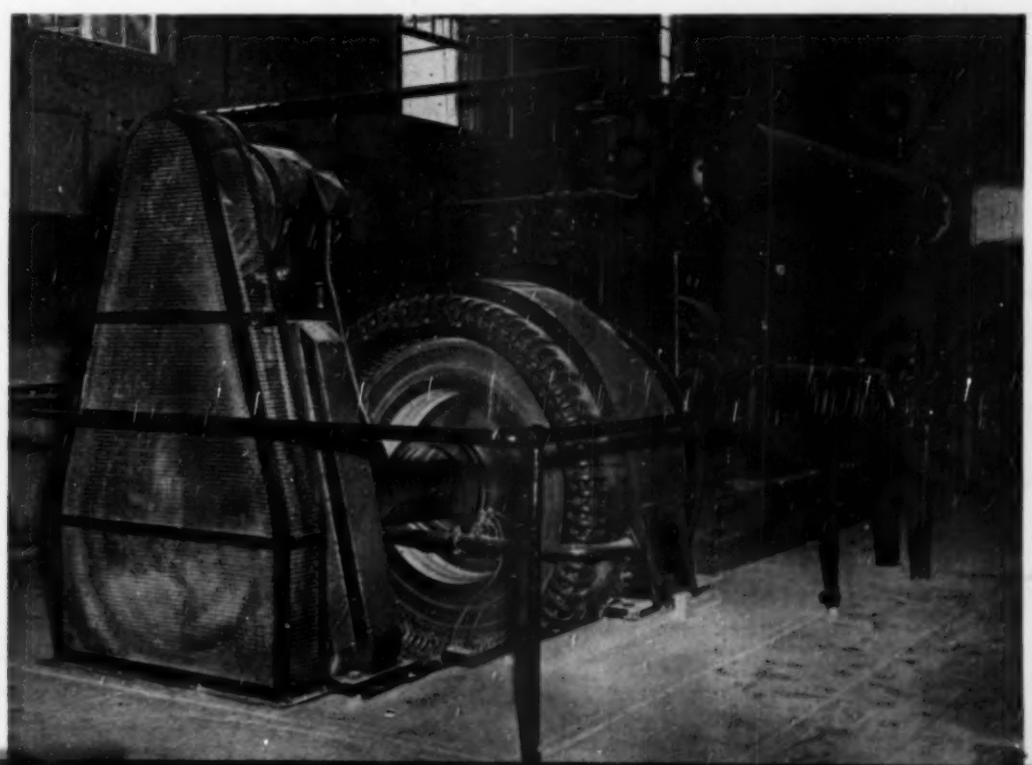
EXTENSION of rural electrification is going ahead in the Dawson Creek district of the British Columbia Power Commission as a result of the installation of two 865-hp. Cooper-Bessemer convertible gas-diesel engines to the plant which serves three towns and their adjoining farming areas. The first of the pair went into use late last year and the second new generating unit was installed late this summer to meet the growing power needs of the Peace River country in the northeast corner of the commission's British Columbia operations. Prospects are that natural gas some day will be available in the district, and for that reason the convertible gas-diesel engines were selected as best meeting ultimate needs of the power plant. Th 6-cylinder Model J-S engines have a 13-inch bore and 16-inch stroke. They develop 750 kva., or 865-hp., at 450 rpm. They use the Cooper-Bessemer regulated pressure type of injection system, with Bosch nozzles.

The first engine is connected with an Elliott Company exciter unit, V-belt driven at 1,800 rpm., which is mounted on a frame directly above the outboard bearing. The second vent has a Canadian G.E. generator of the same type. The new engines are additions to the plant, which was built by contractors for the United States Army during the war, when the Alaska Highway was under construction. Ultimately acquired by the British Columbia Power Commission, the little plant at one time attempted to serve a mushrooming population in the Dawson Creek area which at one time numbered more than 20,000 people. The original plant, as built for the Army, consisted of three Fairbanks-Morse 360-kva. alternators, and a Buckeye 300-hp. engine direct connected to a 250-kva. alternator and having a belt driven exciter.

In order to serve the fast-growing Dawson Creek district, where there are more than 1,350 customers on the books, and in order to make expansion of the rural electrification program possible, the power plant's capacity was increased by addition of the two Cooper-Bessemer units. In addition to serving the town of Dawson Creek, which has a population of about 4,000, the plant is the source of electrical power for Pouce Coupe and Rolla, towns which are centers of rich agricultural areas. Construction of distribution lines in a district where something fewer than two farms for every mile of line is the average is no slight chore. However, 40 new rural connections will be made during 1950. An indication of the power requirements for the area served by the plant may be gathered from figures for its first three months of operation, before the second Cooper-Bessemer unit was in operation. The output for that time was 719,320 kwh., with an installed capacity of 1,900 kva., using 48,776 gallons of fuel.

A total of 1,754 hours actually were operated during those three months, with a 68.3 per cent load factor. Production was at the rate of 14.7 kwh. per gallon, according to F. W. Stansfield, district manager for the power commission. New and lower rates were placed in effect early this spring as the rural electrification program was extended. On a 2-kw. demand the first 40 kwh. are now charged at 10 cents, the next 120 kwh. at 2½ cents and any excess at eight-tenths of a cent. These charges compare with the lowest previous rate for the third block of consumption over 120 kwh., which was 3 cents. Charges under commercial power schedules were reduced on a corresponding basis which compares with reductions given rural users.

Delivery of the second Cooper-Bessemer unit was made in July, and as with the first one, it carried this equipment: Trane Co. radiator, Air Maze air filter, Woodward hydraulic governor, Pickering governor—overspeed, Elliott Buchi supercharger, Westinghouse gas control, Canadian G.E. generator, Alnor pyrometer, Cuno edge type full flow lube oil filter, and Fulton Sylphon valves on cooling water and lube oil. The plant operating personnel consists of four operators and a chief operator.



DIESEL DOUSES DOCK FIRES

Seattle Water Front Protected by Modernizing Old Coal Burning Fire Boat Built in 1909 and Re-Equipped Recently to Give City Most Modern and Powerful Vessel Afloat for Battling Flames

By F. HAL HIGGINS

SEATTLE has recently brought its waterfront fire fighting up to as high a standard of efficiency as can be found in any city waterfront in the world, according to fire fighting specialists who know their tools of this type of war. Such protection to property along the docks is all important in both peace and war as an insurance against disaster from flames. It was only recently that the old steam powered fire boat *Duwamish* was modernized to this efficiency by the replacement of the old steam power equipment with diesel engines. Your Old Reporter noted this new modern diesel marine job as he looked longingly across the sound toward where he had seen the big salmon jumping out of the water as he rode the first diesel ferry boat 14 or 15 years ago. So, the visitor turned to his Chamber of Commerce friend and asked for the facts as to who, when, and how. The questions were all answered fully through Co-owner E. A. Black, of Commercial Ship Repair, who passed the detailed engineering on to Frank E. Blumberg, member of the Society of Naval Architects and Marine Engineers. Mr. Blumberg had only recently presented a paper covering this change-over fire-fighting *Duwamish* at a meeting of the Pacific Northwest Section at Seattle. Hence, this data was all up to the minute.

For many years the *Duwamish* has needed a thorough modernization. As a steamer she was slow getting under way even with full pressure in the boilers, one man had to be on watch, pumping capacity 9,000 gpm. was low, and she was hard to maneuver. Shortly after the recent war, when Navy surplus material became available, the City of Seattle purchased diesel engines and auxiliaries for both the *Alki* and the *Duwamish*. The *Alki* was modern in all respects except for the gasoline engines. The *Duwamish* required modernization in many respects, including complete replacement of propulsion and pumping machinery. The machinery and electrical equipment that was purchased for the *Duwamish* had been built for a U. S. Navy ARS salvage tug. It was new and in the manufacturers' original crates when received. It consisted of four diesel generators, a double control panel, four propulsion motors, two reduction gears and all the auxiliary parts such as coolers (oil), jacket water coolers, air receivers, lube oil pumps, etc., except auxiliary generators. The diesel engines are rated at 720 hp. at 675 rpm. continuous and 900 hp. at 750 rpm. emergency rating, and the motors are rated at 765 hp. continuous duty. It was evident from the start that only three engines and generators would be required for full power under any condition of fire fighting, and that two motors, one per shaft, would be more than ample for propulsion. This made two motors available for the fire pumps.

The two fire pumps are the largest pieces of equipment not furnished with the ARS machinery. Thanks to the wide range over which the motors develop their full power—1,045 to 1,350 rpm.—it was possible to select pumps that would have a wide range of discharge pressure at full power and retain high efficiency. They are DeLaval type 765E single stage with 18-in. suction and 16-in. discharge connections. The combined pumping capacity is as follows:

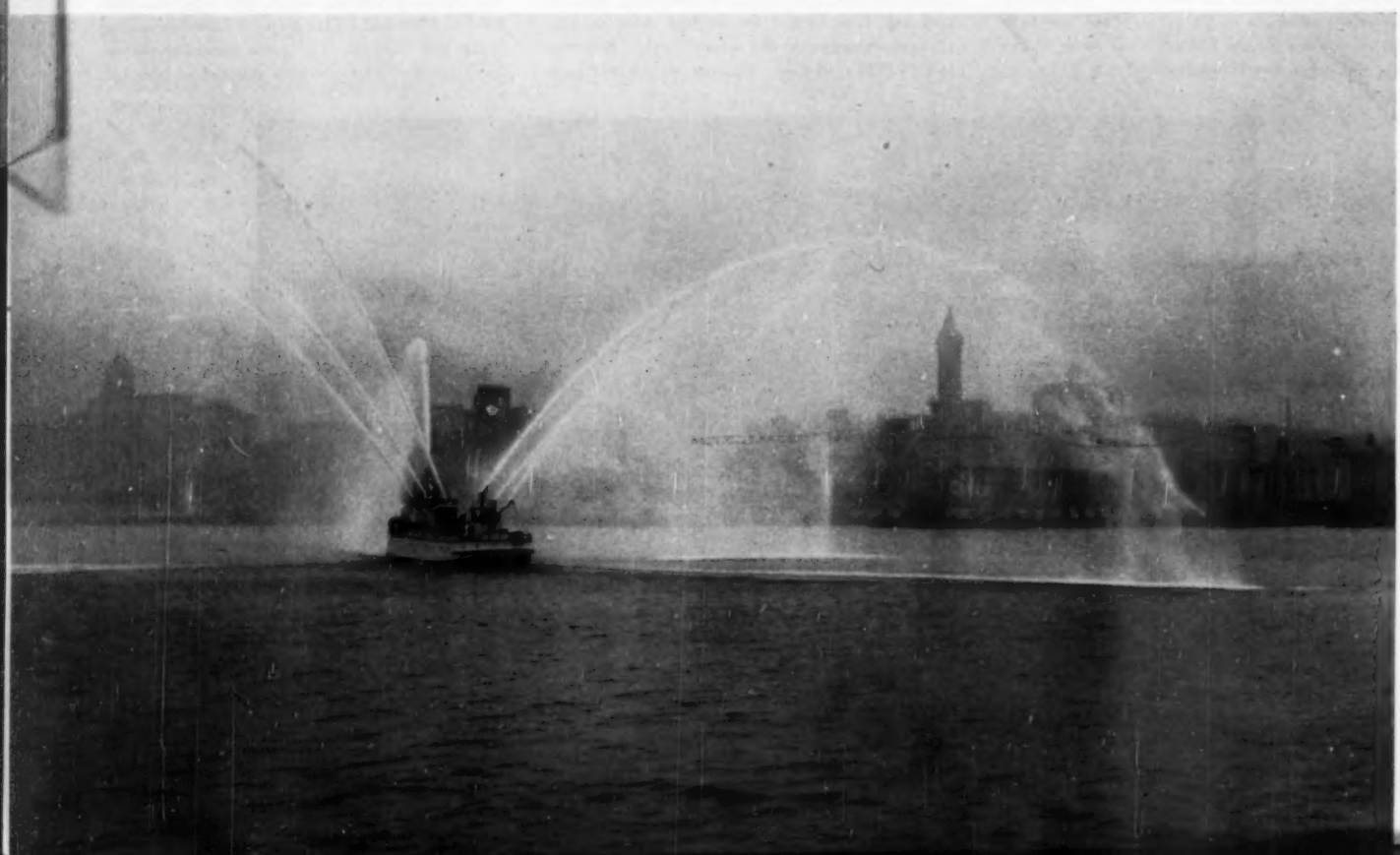
22,800 gpm. at 100 psi., 1,160 rpm., 86 per cent eff.

18,800 gpm. at 120 psi., 1,210 rpm., 86 per cent eff.

18,000 gpm. at 125 psi., 1,230 rpm., 85 per cent eff.

9,000 gpm. at 250 psi., 1,230 rpm. 85 per cent eff.

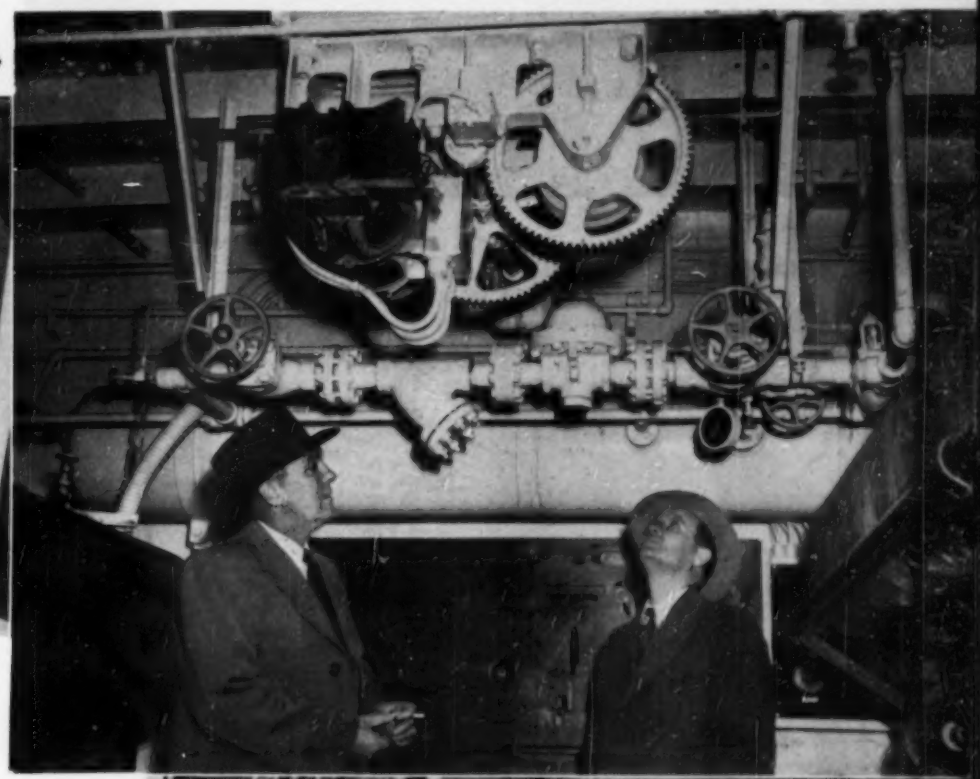
In order to take full advantage of the quick starting features of modern diesel engines, steam heat connections are made to the lubricating oil and jacket water systems of the three main engines. Thus the engines are kept warm at all times and can be brought up to full power in a fraction of a minute and with a minimum of wear. Radiation from the engines keeps the machinery space at a comfortable temperature. The lubricating system of each main engine is self-contained. Generator bearings are connected to the main engine. Lubrication of the pumping and propulsion motors and the reduction gears is independent of the engines. Two sets of combined sea water and lubricating oil pumps are installed at frame under the main



power panels. Each set is driven by a single motor with double shaft extension and lube oil pump at one end and salt water pump at the other. The oil coolers are attached to reduction gears inboard. The requirements for propulsion and pumping on board the *Duwamish* made several changes necessary. The inboard motor was removed from each reduction gear and used on the fire pumps. The main control panel, originally one double motor panel and two generator panels, was cut in two and one part used for propulsion and the other for pumping. Each main panel now consists of one motor panel and one generator panel. Originally two motors connected to one shaft were handled as one motor. In the present installation there are two propulsion motors, one starboard and one port, connected to the propulsion panel and therefore some modification was required for power ahead on one shaft only, or for power ahead on one shaft and astern on the other. Furthermore, only three, instead of four generators are installed, with provision for using any one of any two generators on pumping, and either generator No. 2 or No. 3 or both for propulsion. No. 4 set-up switch in the propulsion panel is used for a direct short across either motor, thus, when closed, eliminating that motor from the propulsion circuit.

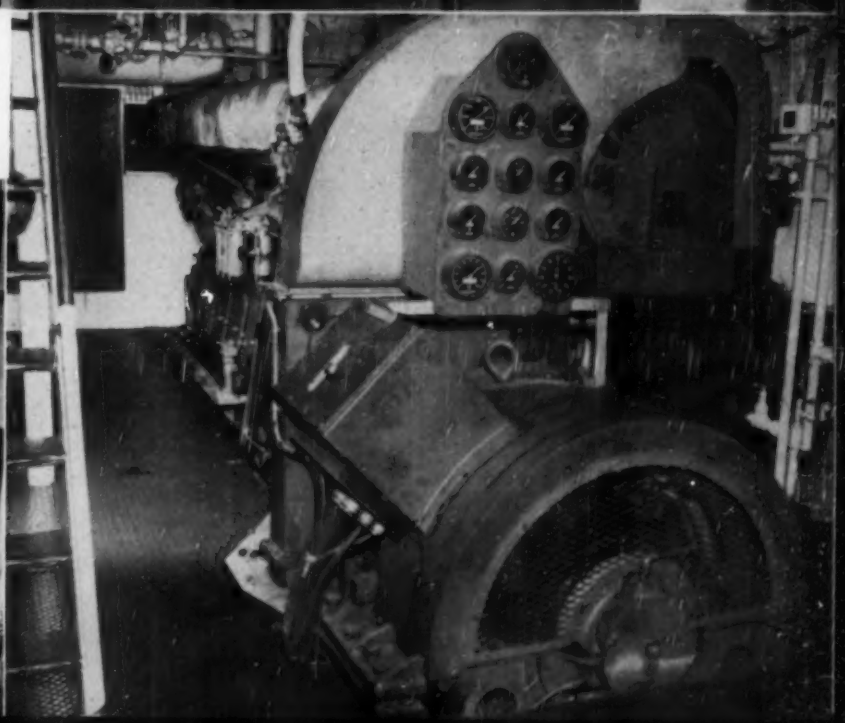
Modernization of the *Duwamish* was completed and trials run on November 9, 1949. With the exception of a few minor items the performance was satisfactory and she was accepted by the city a few days later. The speed on one diesel only is fully as much as with the old steam plant; steering is improved, thanks to twin rudders; and the pumping capacity is over twice that of the old steam plant. At present the ship is being used for training the permanent crews that will be assigned to her. Now the City of Seattle has two of the largest fire fighting boat afloat, modern in all respects and in excellent condition. Let's hope that, like an army, they will never be needed.

Herman Sanwick, Marine Superintendent in charge of installation of fireboat equipment, and A. H. Lindgrin, General Manager, Winslow Divison, looking over Sperry steering gear machinery.

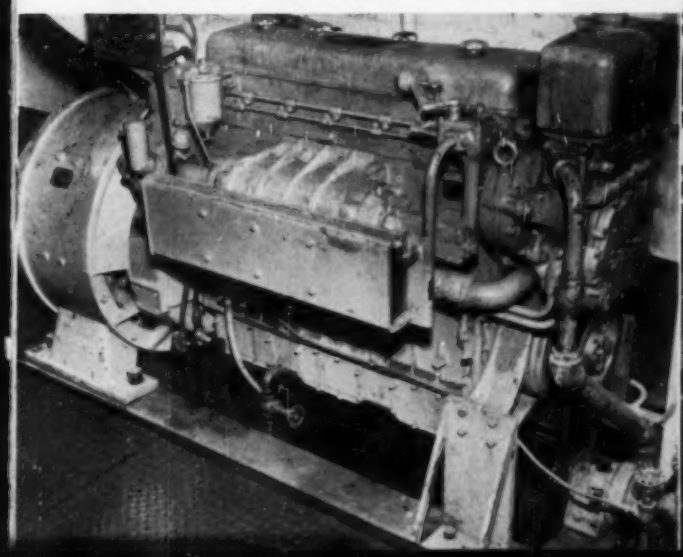


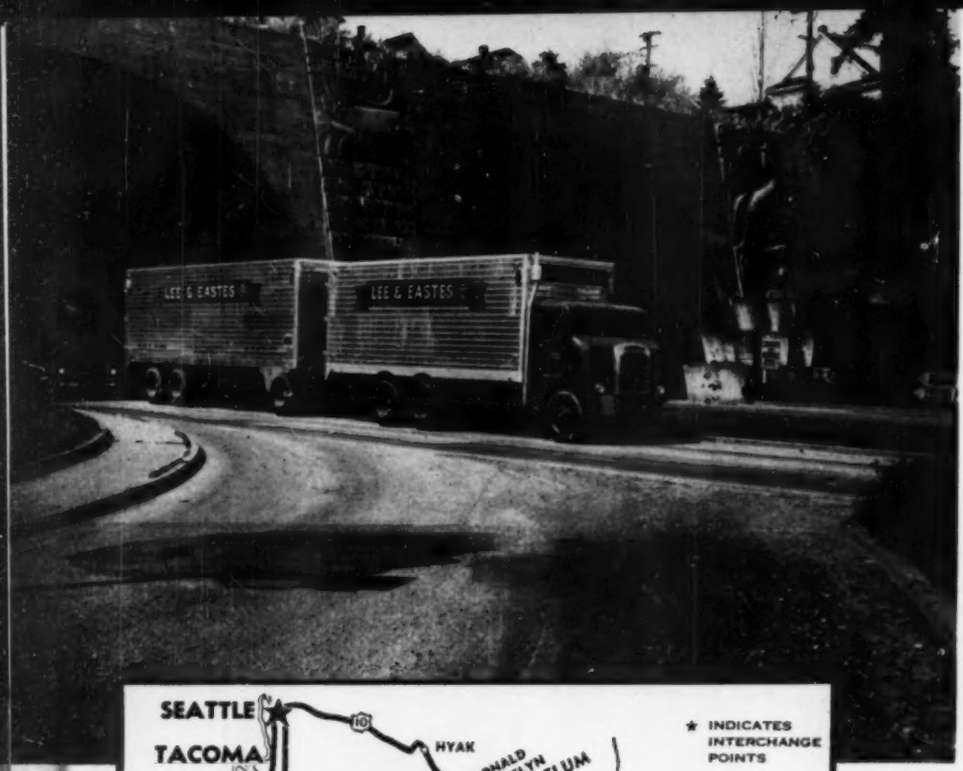
Left to right: A. H. Lindgren, General Manager, Winslow Division, Commercial Ship Repair; Bill Jones, Superintending Engineer, City of Seattle Fire Department; and Herman Sanwick, Marine Superintendent in charge of installation of fireboat equipment, standing in front of one of the large Cooper-Bessemer thousand horsepower main units.

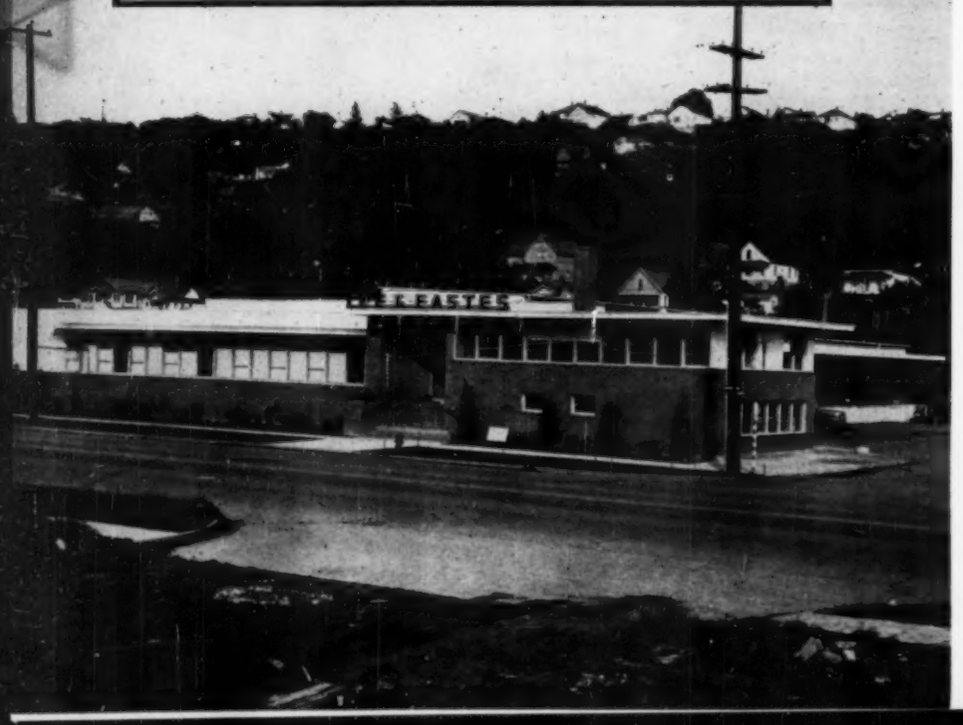
Shot showing generator and main Cooper-Bessemer engine in background. All main engines are mounted on Korfund isolator.



General Motors starting and lighting generator. Two were installed on fireboat.







DIESEL TRUCKS MAKE MONEY

Lee & Eastes Make 6,000,000 Miles Per Year With Their Diesel Truck and Tanker Fleet

By CHARLES F. A. MANN

TWENTY-SEVEN years ago Mr. Arthur Lee and Mr. George Eastes had great visions of what part organized, regulated and regularly scheduled motor freight would play in the development of the Pacific Northwest. They bought a little auto freight outfit known as Forbes Auto Freight on April 1, 1923, and each drove his own truck on a route between the rich valley town of Puyallup, Washington, and Seattle. Three years later Lee & Eastes expanded to Seattle and Portland, and they began operating trucks with the sensational pneumatic tires, then making their first bow to replace the old pavement-busting solid tires. Eight years after the partnership was formed they began hauling bulk petroleum between Seattle and Yakima, with two tanker units. From then on Lee & Eastes started to go places in a region of heavy agricultural, forest products, manufactured goods, mining products and products of the sea, which, despite its intense railroad network, is a region of mountains, ferryboats, islands and expanded growth that makes it surprisingly dependent on huge highway networks that go "above and beyond" the rail routes.

Way back in 1934 Lee & Eastes purchased their first diesel for truck use. In 1937—13 years ago—diesel became 100 per cent standard with the firm. It is one of the most completely dieselized large-scale truck operations in the west. The Lee & Eastes "empire" is mainly a large triangle, with its twin terminal axis at Seattle-Tacoma and Portland, with two legs extending to the Yakima Valley and Hanford-Richland-Pasco on the Columbia River. The combination gives Lee & Eastes one of the richest two-way haul operations in the country. Manufactured goods and petroleum eastbound on both routes and agricultural products and manufactured agricultural products westbound, with only the fall seasonal glut of westbound agricultural products to contend with.

The company is offering a fat reward for somebody to devise *something* to ship westbound in the empty petroleum tankers! Operating terminal bases are maintained at Seattle and Portland, with general offices and general shops at Seattle, and a joint Puget Sound freight terminal at Tacoma, operated by the Seattle office. All truck and trailer moves from Seattle and Tacoma to Portland interchange trailers with Oregon, California and Nevada fast freight lines to give a complete

coastwise shipping service for their customers. Two years ago large terminal offices, company headquarters and general shops were established on East Airport Way at Seattle, to match the new Portland terminals erected a year previous. The L. & E. fleet consists of the following: Thirty large cargo truck units, twenty-eight of which are diesel, and all of them Cummins powered. Nine of them are Cummins N.H.'s of 200 hp. each and 19 are 165 hp. Cummins HBR's. All are of 20 tons capacity and are either Sterling or Kenworth units. Two gasoline powered service trucks are used, one each with a Waukesha and a White gas power plant. Fifty pick-up trucks of 2½ tons capacity, representing almost every type manufactured – Diamond T's, Internationals, Fords, Chevrolets, Dodges, GMC and Whites. Two flat-bed trucks for terminal use are each powered with Cummins HB. 150-hp. diesels.

The dry cargo fleet's most important units outside the powered outfits are the 50 large trailers for line haul freight. The Lee & Eastes tanker fleet, operating in Oregon, Washington and Idaho, consists of 18 units, consisting of 17 tractor units each of capacity of 2,800 gallons and full trailers with 3,700-gallon capacity. A large new semi-trailer with a capacity of 6,300 gallons completes this division of the L. & E. fleet. The diesel tanker fleet consists of 16 Cummins powered units, two of the 200-hp. size and 14 of the 165-hp. size and two General Motors units of 175-hp. each.

The fleet operates day and night on timetable schedules. Organized maintenance and repair routines are all set up at the Seattle shops, with an elaborate card record system, based on trip reports kept in triplicate and given to the shop foreman and operating superintendent; a PMS report, and a major work card. The Faber Laboratories do a continuous oil analysis report on the lube samples from each diesel unit, the recommendations on which are followed to the letter by L. & E. maintenance men.

With the diesel tanker and dry cargo fleet now piling up almost 450,000 miles per month, the scheduling of preventative maintenance work must be exact and the quality of mechanical work as nearly perfect as possible. Each truck carries a twin Sangamo Tachograph unit, upon which the entire results of each trip are recorded on a pair of graph charts, to give both time and mileage readings and all relevant data for every hour and every mile of each separate run. Time, distance from terminals, engine rpm.'s, road speed and the variations in the degree of swing of the needles tell the experienced operating manager everything from whether schedules are maintained properly, time out for rest stops or to eat, if speed laws were lived up to; accident locations and all other data. At first the drivers were touchy, but when the good old Sangamo's bailed them out of a few nasty traffic situations and told the exact time and location of accidents, etc., *they were happy!*

Spare diesel units are quickly re-installed and the used ones reconditioned thoroughly, block tested and re-installed on the basis of being "new" diesels. The company is one of the west's most efficient, successful and popular motor freight operators, and has done a remarkable job in serving its compact, heavy-freight originating territory that connects the heart of the Columbia Basin with the twin terminals on Puget Sound and the Lower Columbia at Portland. Oddly, its greatest yearly gains periods commenced almost identical with the year it became 100 per cent diesel! The question is: Does diesel earn the profits or does the brainpower attracted to diesel, or is it a happy, progressive combination of *both???*

Mr. Eastes continues in charge of the Seattle offices while Mr. Lee heads the Portland operation, and Geo. J. Eastes, father of George V. Eastes, is Seattle office manager. Vic Jones is safety director, and C. A. Dyer fleet maintenance superintendent. The company now has over 300 employes.

Arthur W. Lee, left; Geo. V. Eastes, right.

C. A. Dyer, Shop Superintendent.

HYPERION SEWAGE DISPOSAL PLANT

Los Angeles Now Operates the Largest Sewage Disposal Plant of Its Type in the World

By ALFRED A. DECICCO

The five engine-driven Electric Machinery generators that produce enough power to make the plant completely independent of outside lines. Each unit is rated at 1,486 kva., 1,189 kw., 3 phase, 60 cycle, 4,800 volts.

ON the same site that was once the background setting of all the old romantic and exciting "Sheik" silent films, now stands the huge Hyperion Activated Sludge Plant, the largest of its kind in the world and containing so many engineering "firsts" that each section of this unique sewage disposal system is a plant in itself. To begin with, the actual planning and construction of the site at a proper grade, as it is on the sand dunes of El Segundo, was an engineering feat that took weeks of tedious planning and incorporated numerous pieces of diesel equipment in the operation. It was necessary to remove some 14,000,000 cu. yds. of sand. This was done by hydraulic means, the sand being pumped along the beach and deposited so as to widen the beach from the south city boundary line to the City of Santa Monica. With the widening of the beach, and the proper sewage treatment accomplished, it resulted into one of the finest beach developments on the Pacific Coast. Bear in mind that this same swimming area had been condemned by the California State Department of Public Health as unfit to bathe in and relax upon since 1943 because of water pollution.

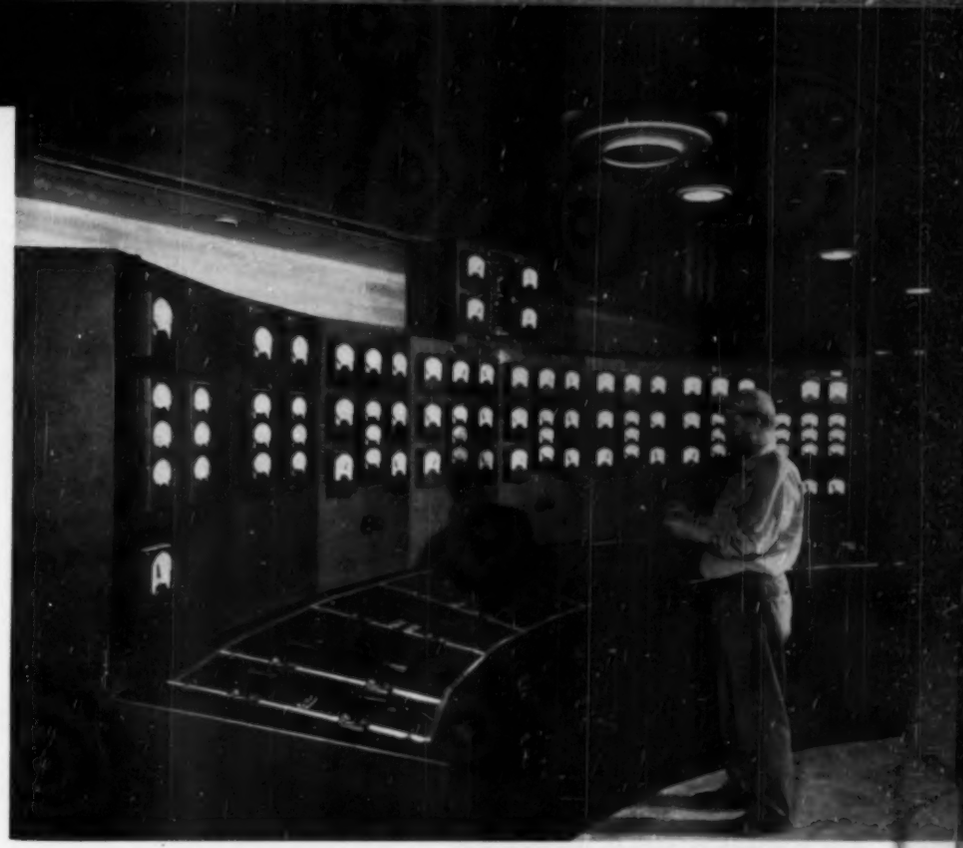
Before going into details of measurement, some background information should be noted and explained. For the past fifteen years, the City of Los Angeles has been suffering from growing pains and the laborious work of the Los Angeles Chamber of Commerce has succeeded in bringing to its grasp tourists from all over the United States. Not only did the tourists enjoy their visit, but many of the monthly travellers retired or began enterprises in Los Angeles. With such an immense increase in population, one can readily visualize the problem of sewage disposal. Practically all of the sewage from the City of Los Angeles and contiguous independent municipalities arrives at Hyperion for treatment and disposal. From 1925 to late 1949, that treatment consisted of coarse and fine screening and ocean dilution one mile off shore. This was satisfactory and proper for a moderate amount of sewage and sufficed until the tributary population began to increase beyond the ocean's capacity to safely absorb the resultant overload. The old method of sewage treatment was not sufficient for satisfactory results and the State of California considered the situation as imperative.

The City of Los Angeles, confronted with this disposal problem, began schematically to construct a plant large enough to handle the large population and to view the fact of more inhabitants in the future. The old plant, as stated before, consisted merely of coarse and fine screening and the engineers of Los Angeles Bureau of Engineering, under the direction of G. A. Parkes, set forth to design a plant that would not only incorporate its own sewage disposal process, but would supply its own power from a source located on the same site so if any failure in the power supply occurred, the trouble could be found and corrected immediately. After much deliberation, it was finally decided that dual-fuel engines would be used, because (1) of the fuel used, 95 per cent will be sewage digester gas and the remaining 5 per cent will be diesel fuel, so utilizing an otherwise waste product; (2) dual-fuel engines will operate on any ratio of gas to oil, depending upon the amount of gas available. At the present time, the engines are operating on full diesel because digester gas is not yet available; (3) dual-fuel engines like gas-diesel are much more efficient than low pressure spark ignition gas engines.

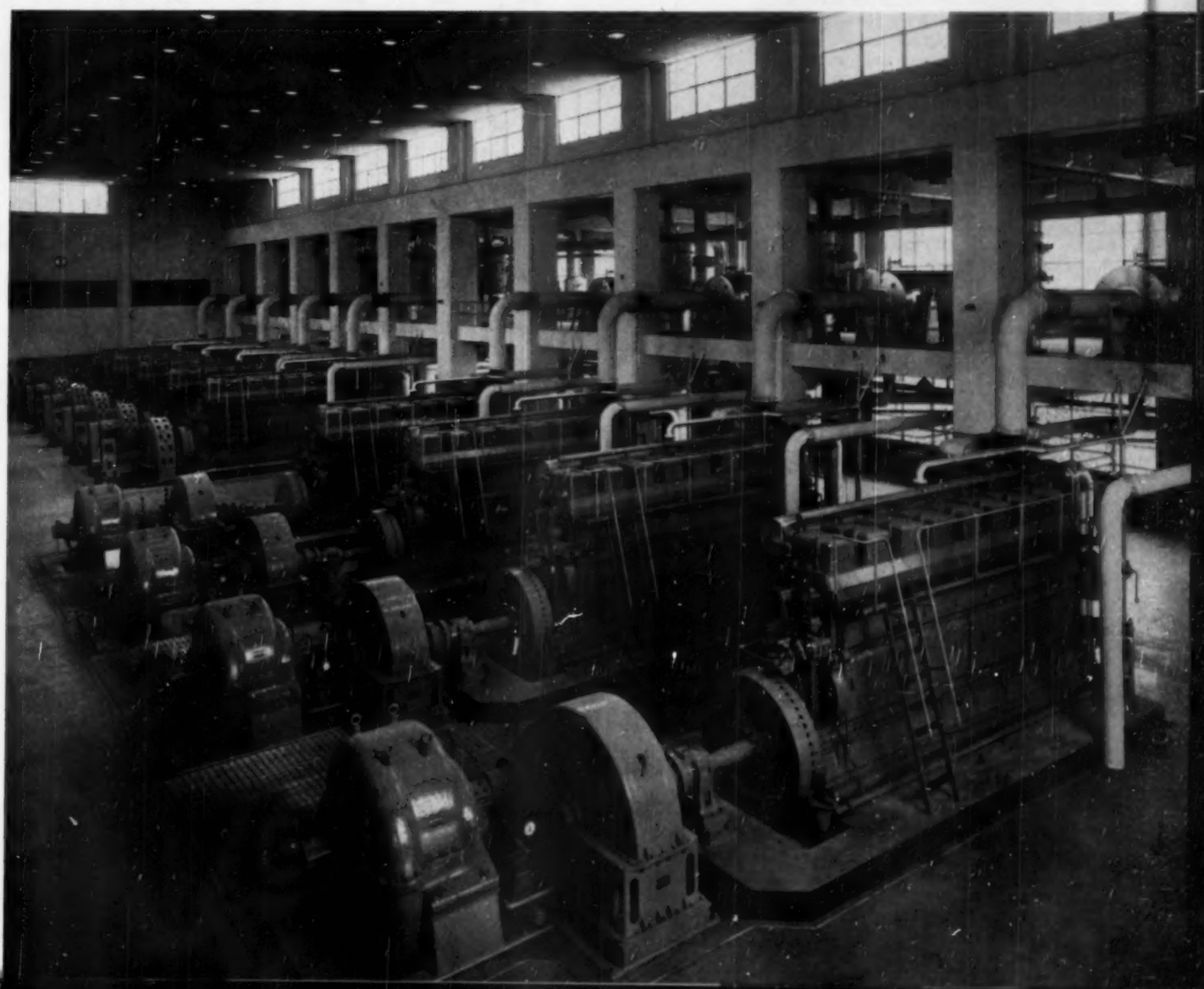
Nine Worthington dual-fuel engines were purchased and shipped to El Segundo for installation. The plans called for five of the nine dual-fuel engines to drive generators and the remaining four to drive centrifugal compressors through step-up gears for aeration.

As stated previously, there are many engineering "firsts" claimed for this sewage plant. No doubt there will be controversies and an utmost surety of numerous comparisons of other sewage plants with Hyperion, but as far as this writer knows the three important and exclusive "firsts" are (1) the method of utilizing waste heat from the engines by means of vapor phase cooling system for heating the digestion tanks by direct injection; (2) the first application in a sewage plant that centrifugal compressors are driven by dual-fuel engines through step-up gears; (3) the largest power plant developing power from sludge gas.

Most of the sewage gas engine installations made today are direct connected to generators. They furnish the power for motor driven equipment such as blowers, pumps, etc. At the Tallmans



Console on upper floor in a sound-proof room where all nine engines are checked and controlled during operation.



General plant view showing all nine Worthington 1,688-hp. dual-fuel, supercharged engines. Five driving Electric Machinery generators and four driving De-Laval Steam Turbine blowers.

Island Sewage Plant, in New York, the pumps are driven through angle gears from the gas engines, and the blowers are direct connected to the engine shaft. As centrifugal blowers (compressors) have been developed for much higher unit capacity, the city engineers suggested that centrifugal compressors be used and driven from dual-fuel engines through step-up gears of approximately one to ten ratio. This permitted all engines for generators and blower drive to be alike, and saved in the first cost of the engines and building space required for housing equipment.

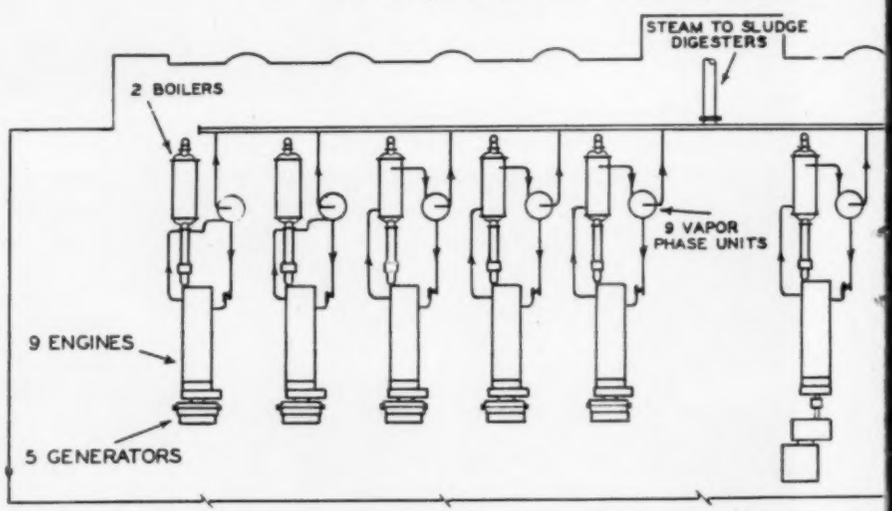
Actual sewage treatment in the plant began on May 15th and the sewage flows to Hyperion through two outfall sewers—the northern and central. These outfalls form a junction in the plant grounds prior to entering the plant proper. The north outfall has a gravity capacity of 450 cu. ft. per second and the central outfall has a capacity of 90 cu. ft. per second—totalling 350,000,000 gals. per day. Sewage first enters the headworks building which contains equipment where the coarse material is separated, comminuted, and returned to the system. This same headwork also contains the chlorination and detritor equipment. The sewage is then passed through two venturi meters (108 inches in diameter) and enters the pre-aeration tanks, where it is treated with air. From this pre-aeration, the sewage flows to the settling tank (primary) in which the main purpose is to permit a considerable amount, about 50 to 60 per cent, of the solid materials to be settled out. Four underground sludge pumping units force all sludge to the digestion tanks. Floating materials such as oil and grease are skimmed from these tanks and also pass to the digesters. The effluent from the primary settling tanks is then by-passed to the aeration system, which is aerated for the development of the aerobic bacteria. The average detention time for this effluent in these tanks is three hours and the application of air will average 0.51 cu. ft. per gallon.

After aeration, the mixed liquor passes to the final settling tanks, where it is distributed to twenty tanks, each 125 feet long and 76 feet wide. The remaining solids are settled out and the effluent, which is crystal clear and contains a minute amount of bacteria, is passed out to the ocean one mile off shore through a 12-foot diameter pipe. This submarine outfall consists of two parts, the inshore and offshore sections. Some of the sludge from the final settling tank is pumped back to the primary settling system and mixed with the incoming sludge.

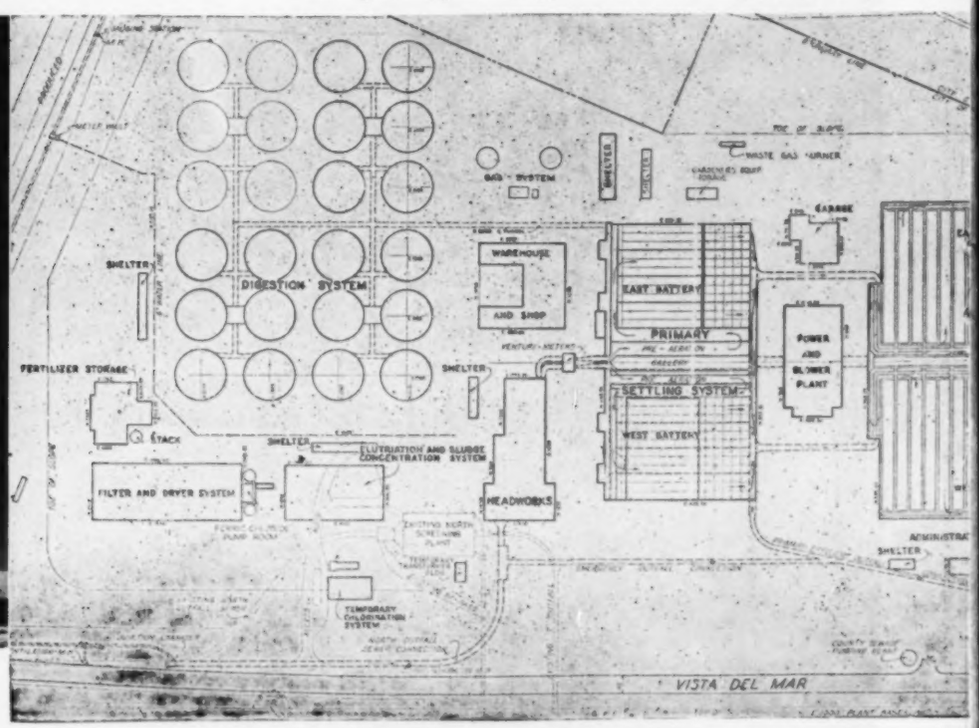
All primary sludge, waste and activated sludge and grease will be pumped to the digestion system, consisting of eighteen tanks, each 110 feet in diameter by 30 feet high, and arranged in four batteries of six tanks each, four primary and two secondary. The primary tanks will be maintained at 95°F. by means of live steam produced from waste engine heat and introduced into the sludge by pressure of the steam coming from the dual-fuel engines driving the blowers and generators in the power plant. Here, methane gas for running the dual-fuel engines is produced. Understandably, the engines must start on the diesel fuel in order to begin operations at the sewage plant. The methane gas produced from the sludge takes from twenty to thirty days to form and is then used for the dual-fuel engines.

This methane gas, basic fuel for the entire power plant, has two definite advantages foreseen by the design engineers. Two-thirds of the methane gas goes to the dual-fuel engines and one-third goes to the dryers. The methane gas is produced by natural decomposition of the sewage sludge which is not to exceed 10-inch water pressure at diges-

Schematic layout of Power Building showing engines with generators and b
Note also layout for Maxim exhaust heat recovery units and Vapor Pha



Drawing of entire plant showing position of Power Building (center). This plant is the la



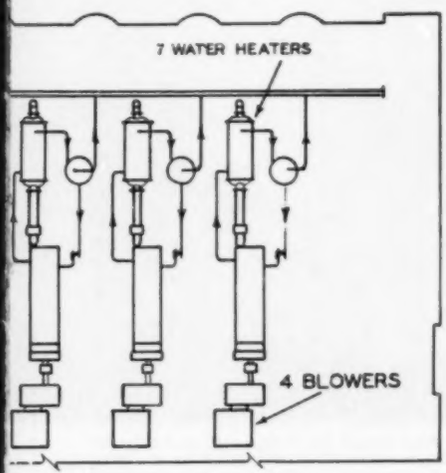
tion. The gas passes through low pressure piping to low pressure gas holds. It is then compressed at 50 lbs. pressure and stored in spherical gas holder at 50 lbs. pressure. Gas being delivered to the engines is held at 15 psi. This same methane gas is used at 1 psi. domestically around the plant and also for the low pressure system (6 inches to 10 inches) in the sludge dryers.

Digested sludge, which is about 95 per cent moisture, is pumped from the digestive system to the elutriation process. Here, it is washed or diluted and re-settled. The purpose for this is to remove a large part of carbonates or by-carbonates which interfere with the subsequent chemical treatment. From the elutriation system, the remaining sludge is pumped to the filter, dryer and fertilizer storage system. Here the sludge is chemically treated and formed into damp "filter cakes" and the produced cake is conveyed to the dryers. The plant will produce 220 tons of fertilizer a day, which will be sold as a by-product.

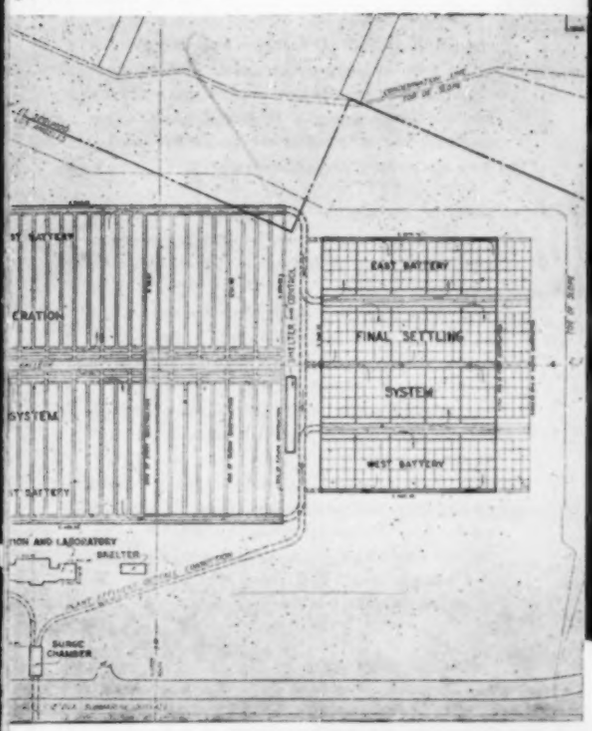
The nine 8-cylinder, 1688 hp. at 360 rpm. super charged dual-fuel engines operate on 95 per cent sewage gas and 5 per cent pilot fuel. The sewage gas is reduced from 50 lbs. to 15 lbs. at the spherical tank with standard regulators. Whenever the full 95 per cent demand is not met with the sludge gas, the gas deficiency is made up automatically with fuel oil, maintaining the full load and speed at all times.

Five of the engines are direct connected to 1,189 kw., 3 phase, 60 cycle, 4,800 volt generators that are designed for a temperature rise not to exceed 40°C. at full load operation, or not to exceed 55 degrees rise at 25 per cent overload for two

lowers in position.
e installation.

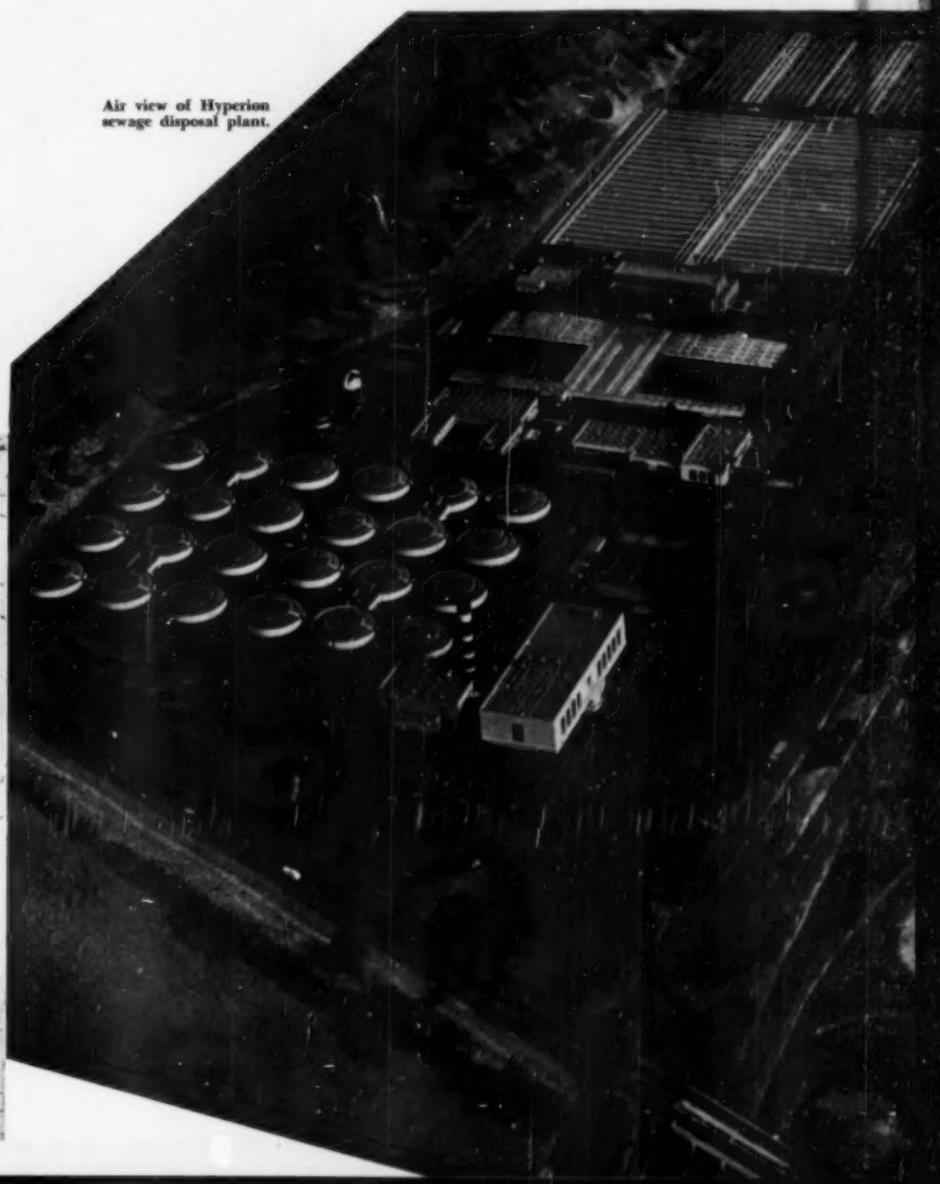


rgest of its kind in the world.



Lube oil is drawn from the clean oil storage tank and is piped through the illustrated Buffalo meter for accurate measurement.

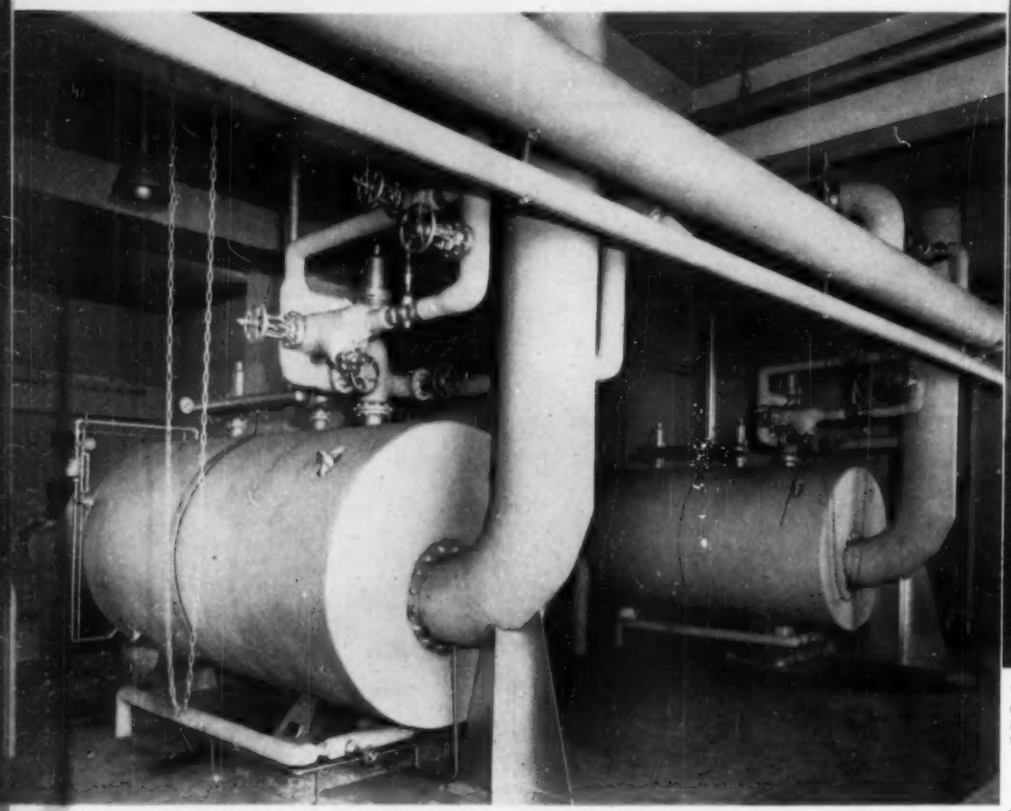
Air view of Hyperion sewage disposal plant.



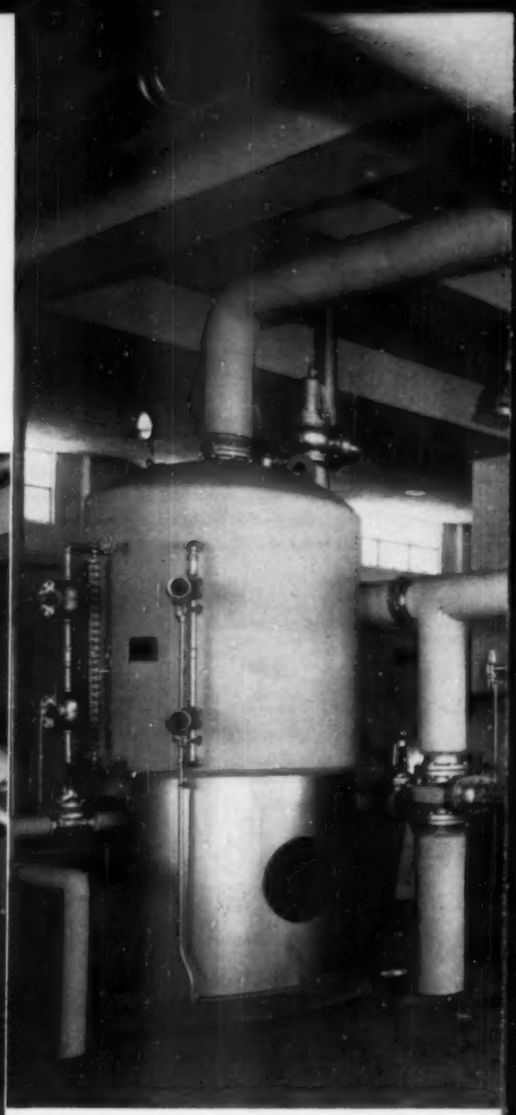
hours. Each generator receives its excitation from a 20 kw., 125 volt ball bearing exciter, V-belted to a pulley on the generator shaft. The five generators supply the entire sewage plant with enough power so it is completely independent of any outside lines.

The other four engines are direct connected to one to 9.4 ratio step-up gears that drive 40,800 cfm. centrifugal blowers at 7¾ psi. These four blowers are two-stage centrifugal type and all are operating in parallel. The blowers produce air used to promote flow in channels and for aeration. A control system was designed to extend the stable range of each blower beyond its normal surge point and to permit operation below the extended stable range by wasting to atmosphere that volume of air required to cool the blower, but not required in the process.

All steam required comes from the vapor phase engine cooling and waste heat recovery system. Up to 95 per cent of the fuel used by the nine dual-fuel engines will be produced by the sludge digestion process; and the engine heat will supply all heat for the sludge and other requirements



Two Maxim exhaust heat recovery silencers of the high pressure steam type that supply steam at 75 psi. for plant use. When this quantity is not required the pressure is reduced to 10 psi. for sludge heating.



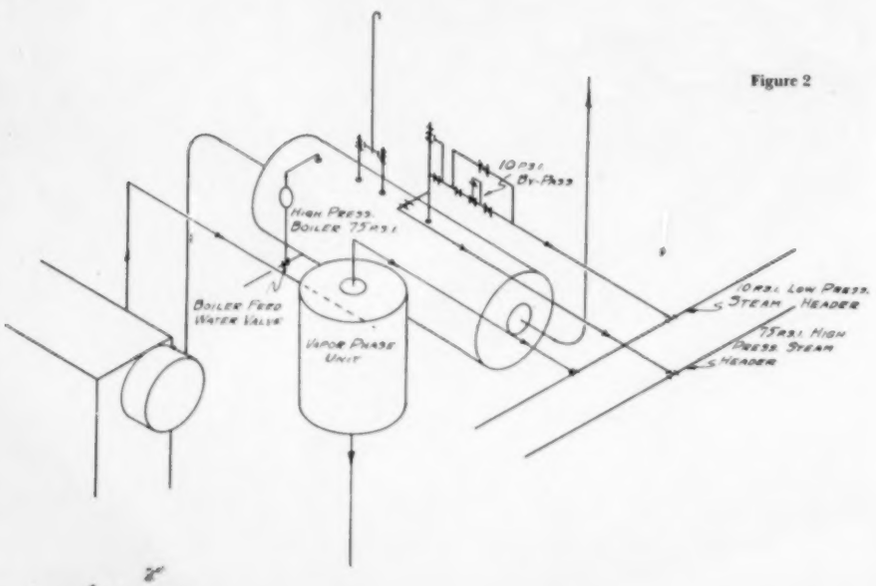
Vapor Phase system and Maxim exhaust heat recovery silencers where all steam required for the plant and sludge heating is produced. Each unit is equipped with safety controls including a high and low water alarm switch.

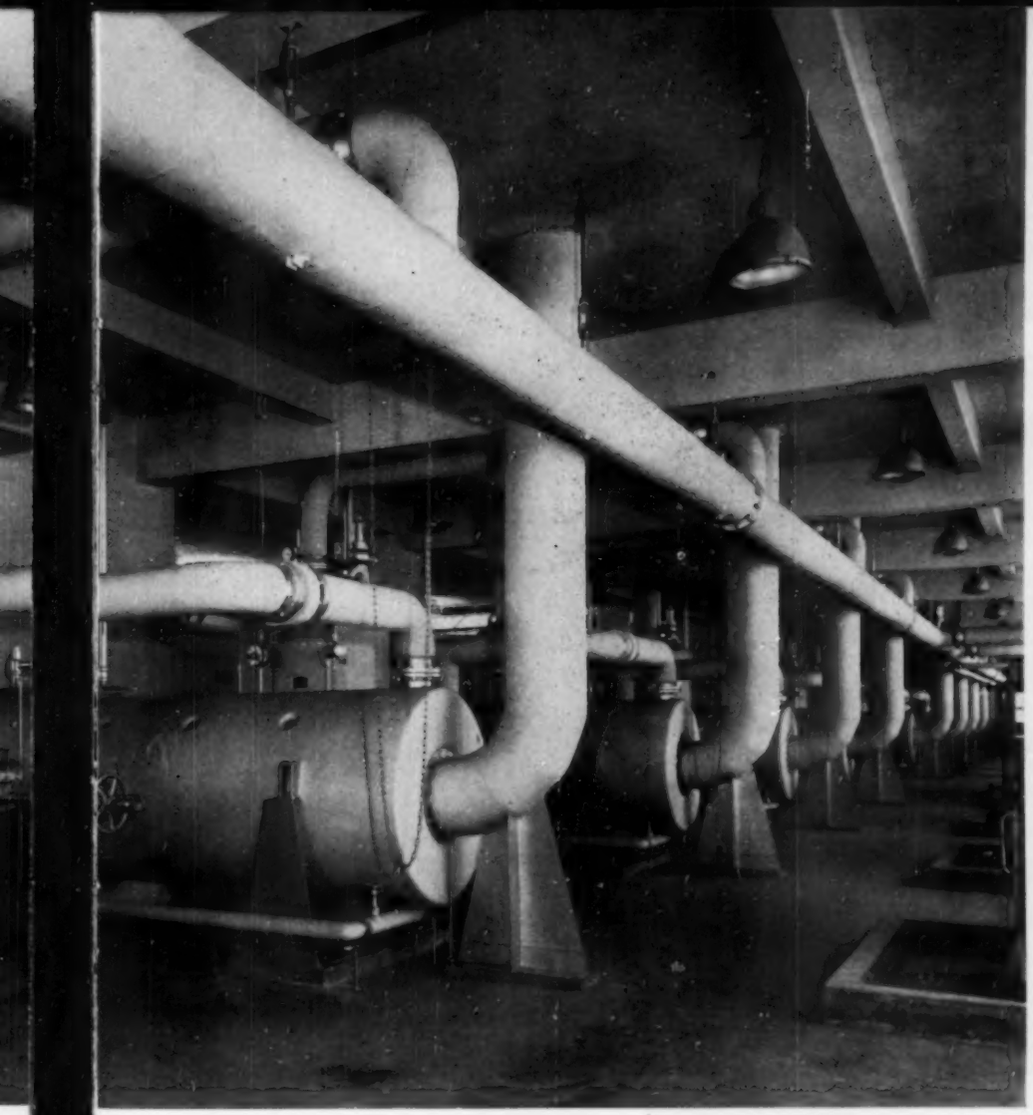
around the plant. The engine heat is recovered in the form of low pressure steam. A still further saving is made by injecting the live steam directly into the sludge digesters. By this method, the engine heat is transferred to the sludge for heating, thus accelerating disintegration.

Seven of the engines are equipped with Maxim exhaust heat recovery silencers of the water heater type as in Figure 1, and operate as follows:

The vapor phase unit *A*, one for each engine, has a built-in steam separator and sedimentation chamber. Engine pump *B* circulates the cooling water from *A* through the engine, absorbing the heat rejected to the jackets, then passes through *C*, the exhaust water heater, where about 50 per cent of the heat rejected to the exhaust is absorbed, then enters *A* tangently, causing the water to swirl in the unit where the engine heat is flashed to steam. This centrifugal action separates the steam, air and solids from the water, allowing clean, air-free water to return to *B*, repeating the cycle. The steam passes to *D*, the low pressure header, where

Figure 2


10 PSI. By-Pass
High Press. Boiler 75 PSI.
Boiler Feed Water Valve
Vapor Phase Unit
10 PSI. Low Press. Steam Header
75 PSI. High Press. Steam Header



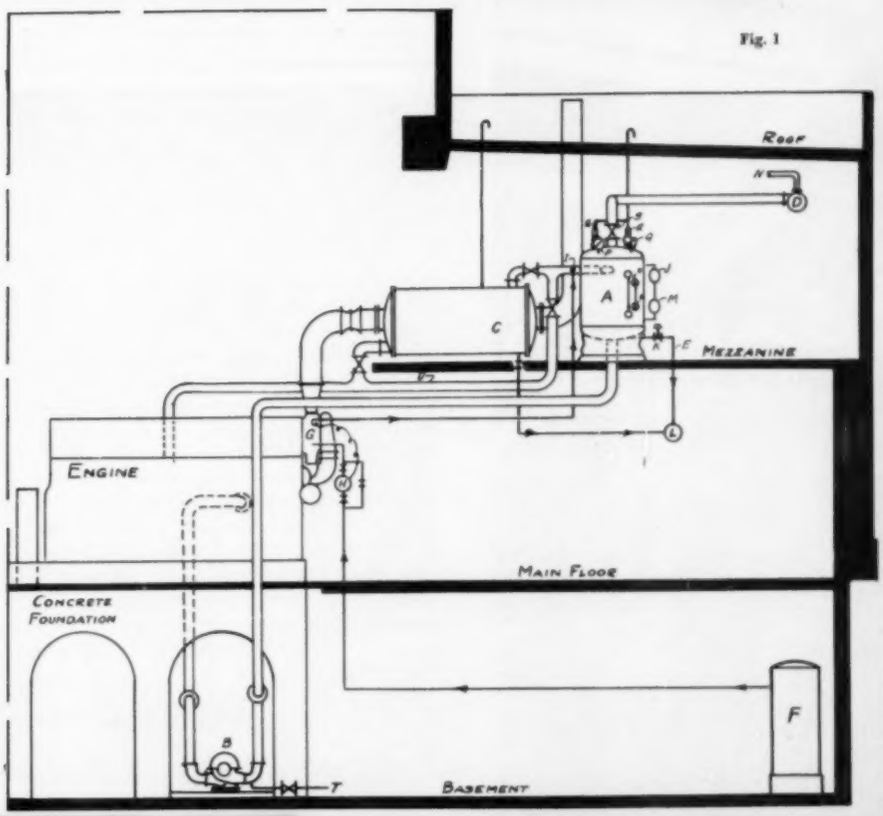
it finds its way to the sludge digesters. Any sediment contained in the water is collected in the chamber at the bottom, where it is blown down as hereafter described.

As all steam used in the sewage treating process has to be replaced, 100 per cent treated water make-up is supplied by softener *F*. The cold water make-up enters the engine supercharger *G*, where temperature is controlled to a maximum of 180°F. by a Fulton Sylphon thermostatic by-pass valve *H*, passing then to unit *A*, and entering it at point *I*, where it mixes with the boiling water circulating through the engine system to 800 gpm. The amount of water required to cool the supercharger is in the order of 6 gpm. more than required to replace the water that has been used as steam. This surplus water builds up in *A* until it is even with level float *J*, which then automatically operates blow-down valve *K*, allowing the surplus to flow through line *E* to the plant effluent header *L*, the low level float *M* then automatically closes valve *K*, and the cycle is repeated.

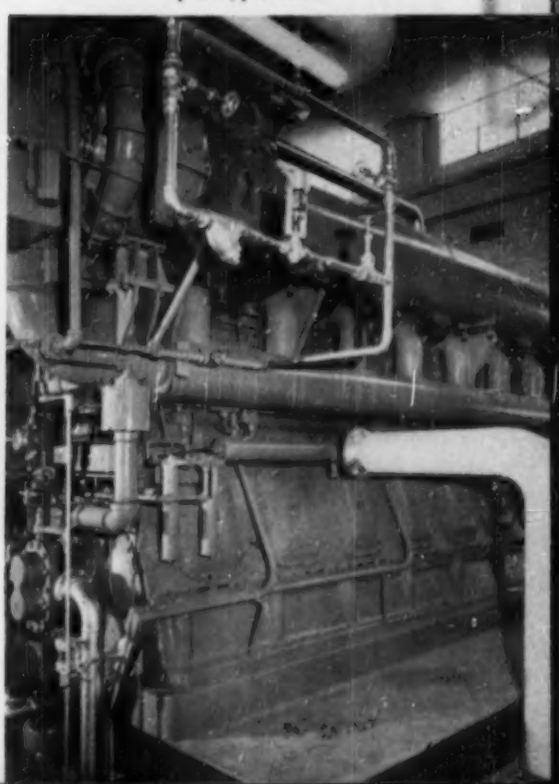
Steam for plant heating is taken off of the header *D* through a 3-inch line *N*. As less heat will be required for the digesters in summer the circulating water may be by-passed around the exhaust water heaters through line *U*, thus any number of the exhaust heaters can be used to maintain steam production to the exact amount required.

Each vapor phase unit is equipped with safety controls, including a high and low water alarm switch, that flashes an indicating light on the engine panel control board, a pressure gauge *P*, air vent valve *Q*, and two steam pressure relief valves *R*. The steam line connecting each vapor phase unit with the header *D* is provided with a valve,

Fig. 1



Busy end of the 1,688-hp. Worthington supercharged dual-fuel engine clearly showing the Manzel Lubricator, Cuno filters, Elliott supercharger, and Fulton Sylphon by-pass valve.

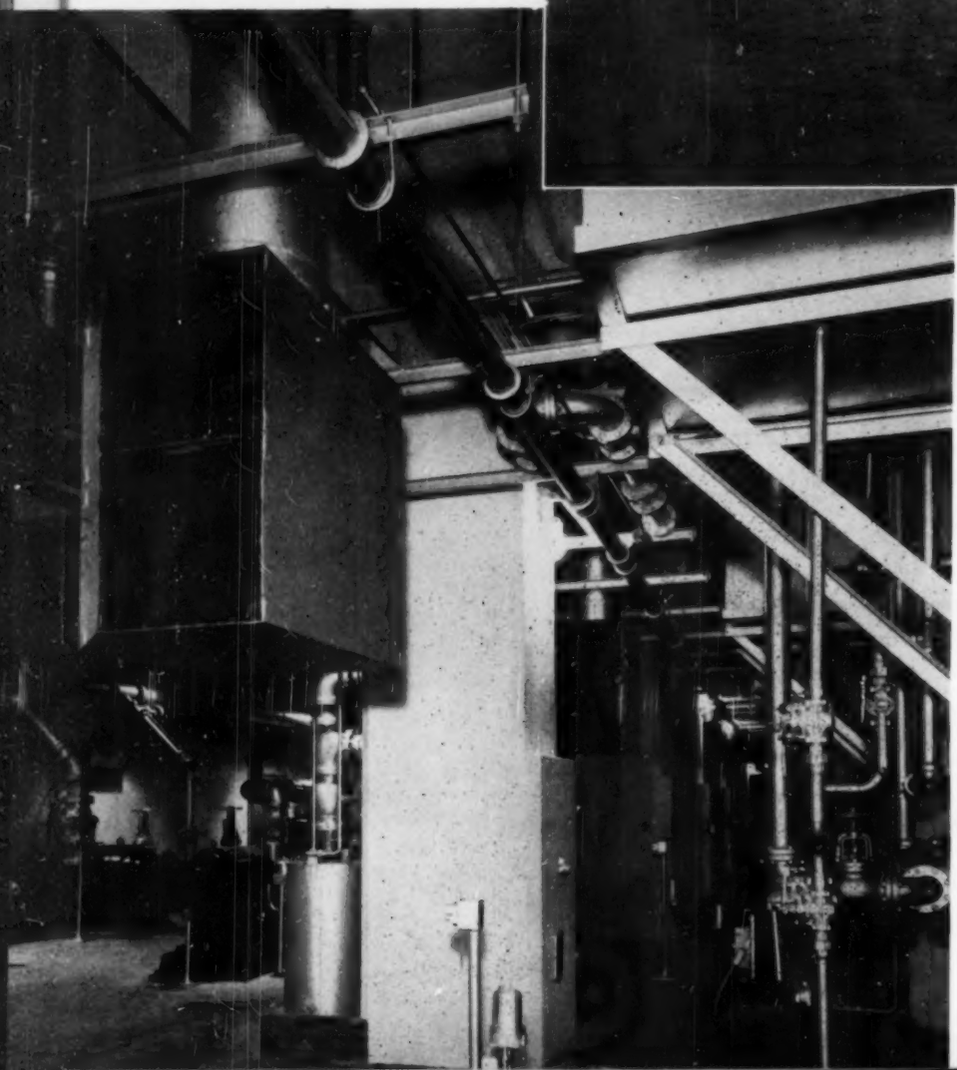


S, which may be turned off and the engine system drained through valve *T* for servicing the engine. When any engine is temporarily shut down valve *S* is left open, admitting steam from the header to flow back into the vapor phase unit; and, by running pump *B* occasionally, the idle engine is kept up to temperature indefinitely.

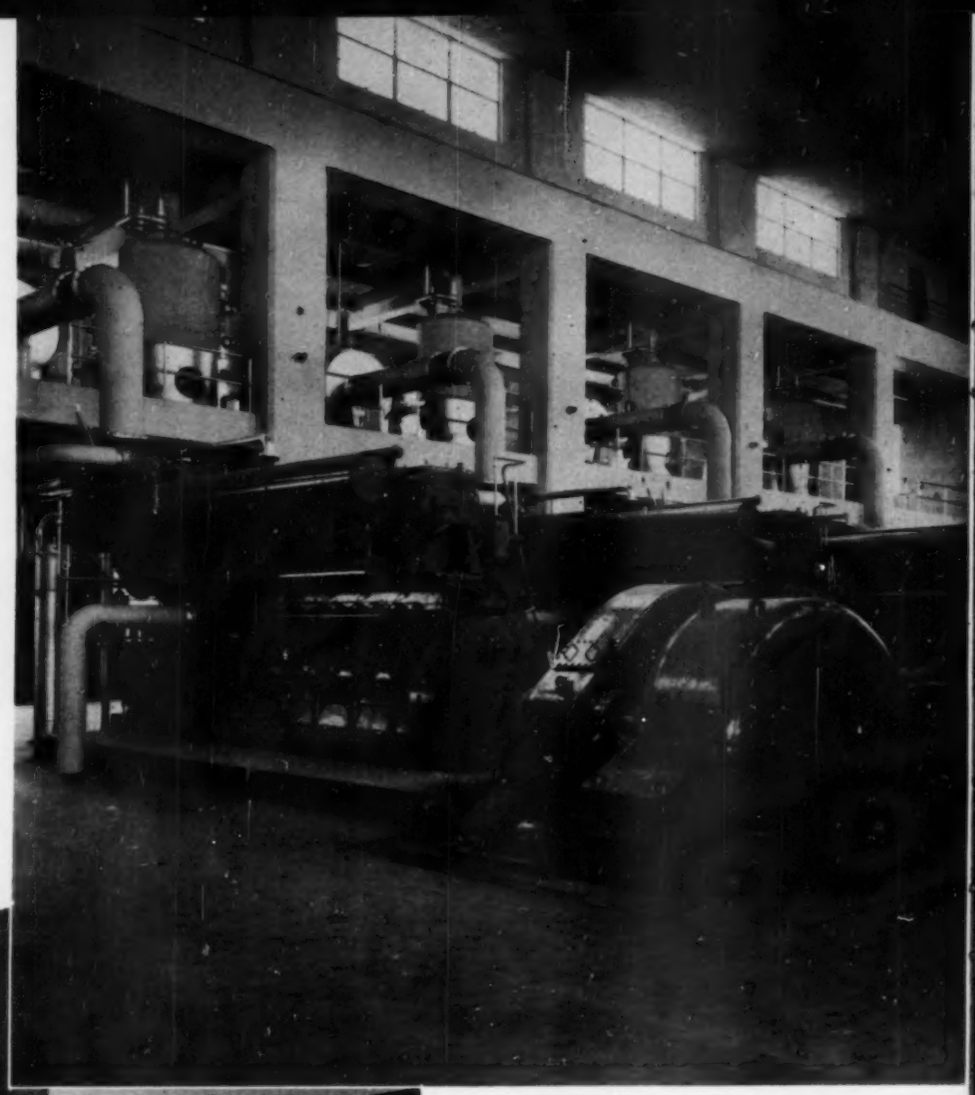
Two of the engines are equipped with Maxim exhaust heat recovery silencers of the high pressure steam type. These boilers illustrated in Figure 2 supply steam at 75 psi. for plant use and when this quantity is not required the pressure is reduced to 10 psi. for sludge heating. These boilers have separate controls and a feed water pump.

The engine lubricating oil is cooled to 135 degrees by a separate stream of the effluent which mixes with the engine cooling water blowdown, and this hot water is used around the plant. The constant temperature vapor phase system has advantages other than waste heat recovery, namely, elimination of condensation, a product of combustion, within the cylinders. The absence of condensation and resultant acid greatly reduces wear (corrosion) in cylinders and extends lube oil life.

Lube oil is delivered to outside storage tanks



American Air intake filters, in foreground, are on all nine engines to take air out of basement, thus producing and maintaining filtered circulation. Lower right shows Hilco lube oil filters.



Four engine-driven DeLaval turbine blowers that produce 40,800 cfm. through step-up gears for aeration.

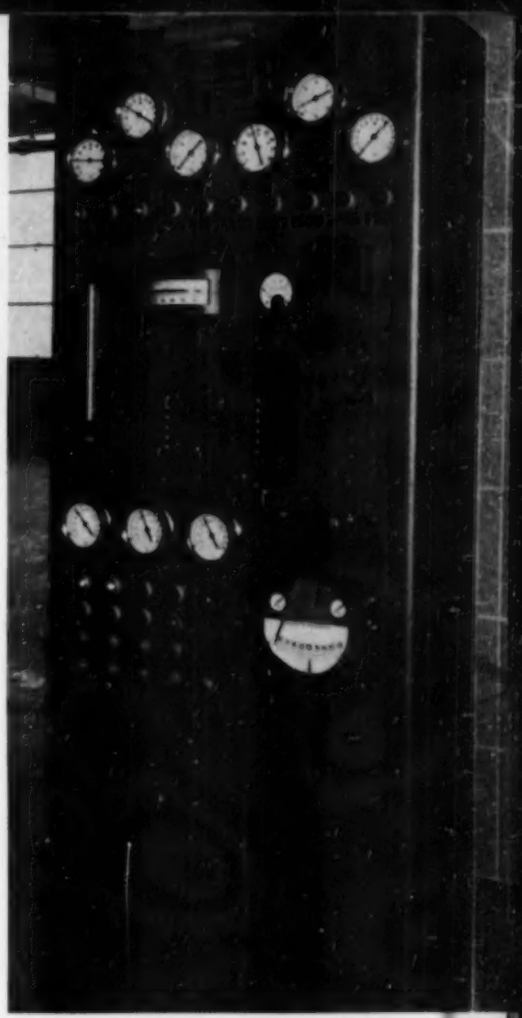
that are of 6,000 gallons capacity. It is drawn from these tanks by the centrifuge pumps and administered to the clean oil storage tank on the mezzanine floor of the power plant. From there, the oil is piped through a meter to the engine sump tank. Engine lubrication is accomplished by the usual full pressure system from the pump attached to the crankshaft.

When it is determined that the oil in the crankcase should be thoroughly cleaned it is pumped by separate motor-driven gear pumping unit to the dirty oil tank in the basement. It is then centrifuged and if satisfactory for re-use, the oil is sent to the clean oil storage tank on the upper floor. On each engine there is a separate lubricating oil filter with a motor-driven pump so arranged that the suction can be drawn from either the return compartment or feed compartment of the lube oil sump tank. After passing through the filter the oil is returned to the feed compartment of the lube oil sump tank. The filter is equipped with electric heater bands and since it is equipped also with a separate pump, filtration can proceed at any time, whether the engine is running or not.

At the present time the plant is using a straight run mineral oil without additives and, therefore, filter pack is of fuller's earth. If at any time in the future additive type oils should be used, the filter packs can be changed to cellulose material.

Fuel oil is delivered by tank truck to external storage tanks of 16,000 gallons capacity. This oil is drawn from these tanks into the centrifuges and is then passed through filters to be stored in the clean fuel storage tanks of 5,000-gallon capacity. The fuel oil day tanks are filled by means of rotary pumps that can be operated either continuously or on a start-and-stop basis. Level controls on the fuel oil day tanks are arranged to admit fuel to the system and maintain level within predetermined limits. Fuel from the day tank flows by gravity to the engine fuel booster pump through a duplex microstrainer, from which it is pumped under 20 lbs. pressure to the fuel header. The engine fuel injection pumps force it into cylinders.

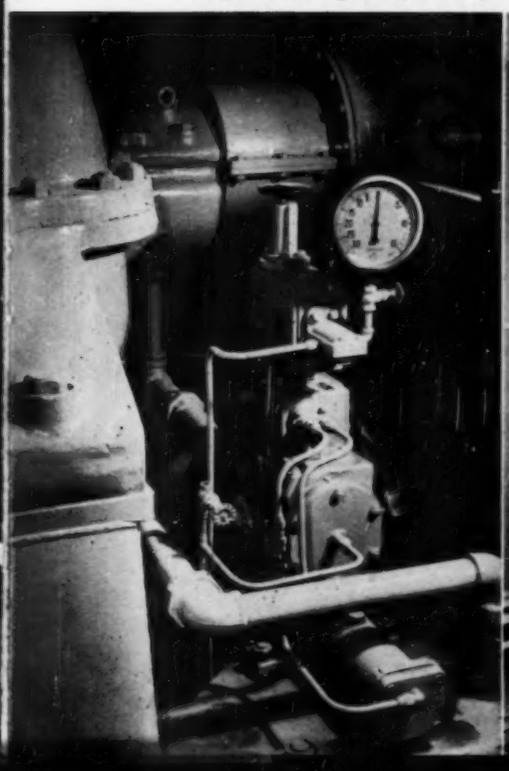
The air compressed by the centrifugal blowers is used for the most part in the aeration system. This air is introduced into tanks through specially designed diffusors, the purpose of which is to produce millions of minute bubbles. Necessarily the openings in these diffusors are of nearly microscopic dimensions, therefore the air passing through these diffusors must be as clean and free from dirt as it is physically possible. To accomplish this, air taken into the centrifugal blowers is first passed through electrostatic air cleaners and then through secondary air filters. The efficiency of this air cleaning method is so high that tobacco smoke will be removed from air passing through the filtration system. The air for the general plant ventilation, and also to supply the engines, is taken in through a travelling impingement type filter and blown into the power house main room through distributing louvers. Each engine is fitted with a stationary impingement type filter

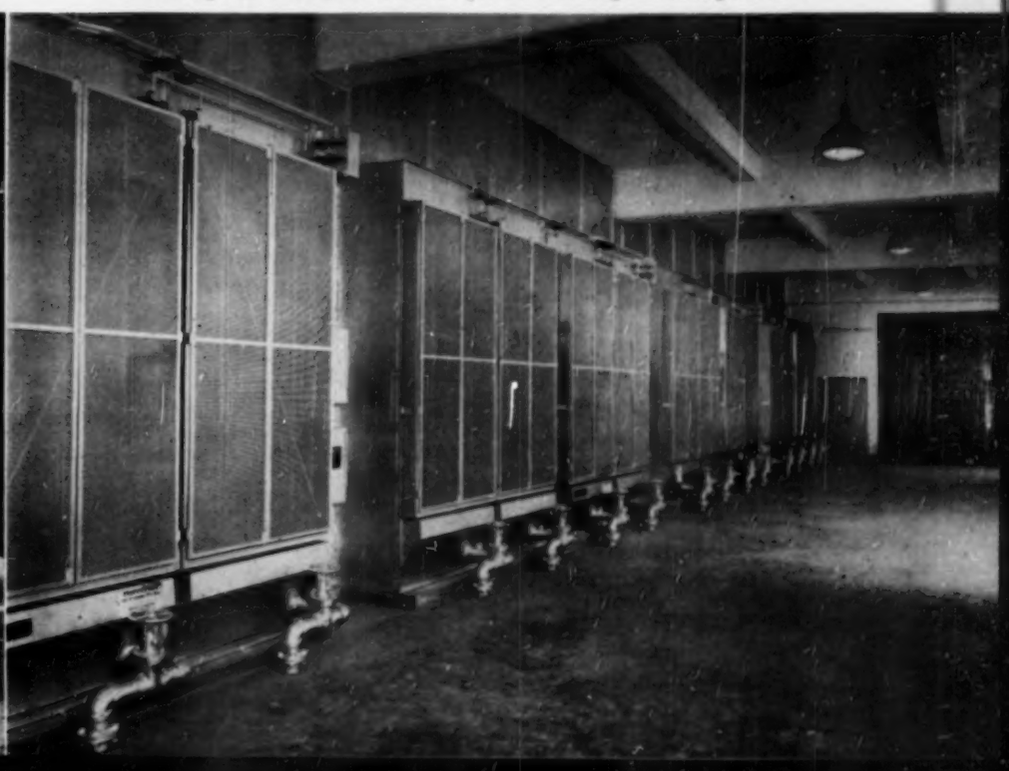


One of nine engine gauge boards incorporating Brown pyrometer, Bristol turbo air intake meter, Meriam manometer and Westinghouse tachometer. All gauges are Ashcroft.

One of two Askania Regulators on each machine which measures blower discharge pressure. The other is a waste valve regulator. Both operate hydraulically.

Filter room showing four American Air electro-matic filters totalling 175,000 cfm. for the intake of the blowers supplying the air for the activating process. Right background is a bank of Continental automatic self cleaning air filters handling 72,000 cfm. The air is taken through this filter and blown into the power house through distributing louvers.





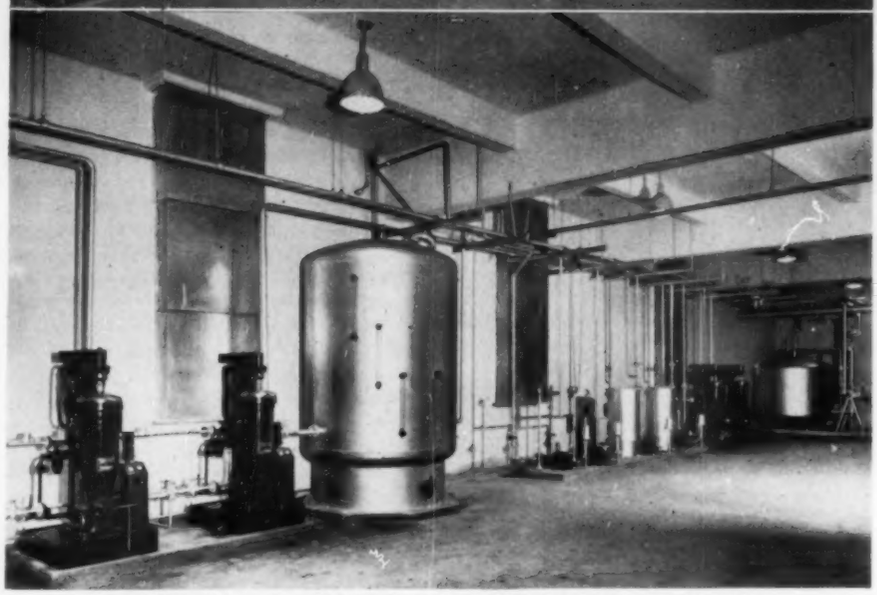
and takes air out of the basement of the building, thus producing and maintaining a natural circulation for the entire plant.

The entire project was carried on under the jurisdiction of the Board of Public Works of the City of Los Angeles. G. A. Parkes is senior engineer in charge of treatment plant design; Merril Butler is in direct charge of the design; and F. M. Darnell is senior administrative engineer. Lloyd Aldrich was general director, working with Metcalf and Eddy as consulting sanitary engineers. When the initial operation of sewage treatment was begun on May 15th, Mr. Parkes was placed in charge of operations as chief operator, and James Glavin was made chief engineer of the power and blower plant.

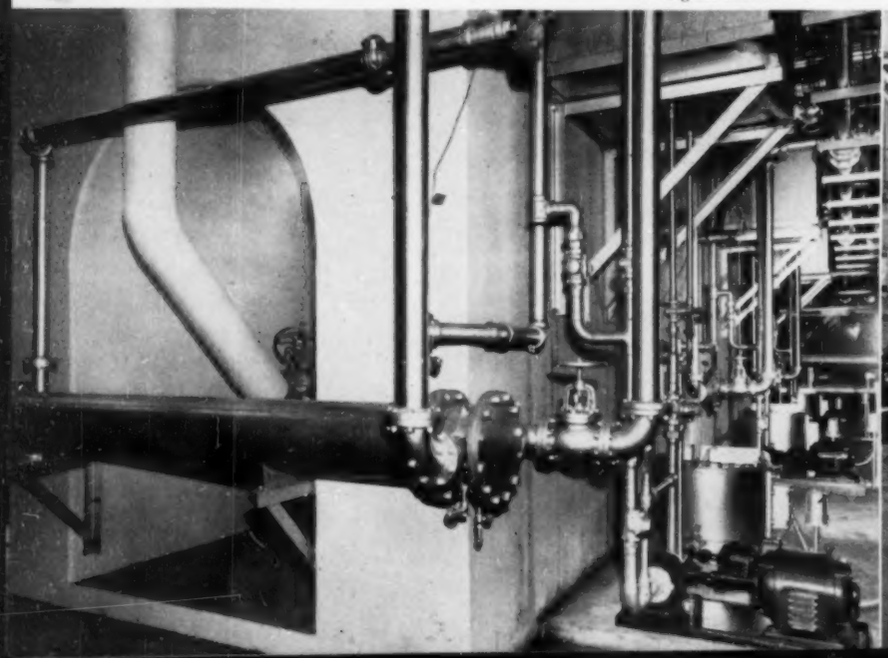
List of Equipment

Pyrometer—Brown Instrument Co.
Governors—Woodward Governor Co.
Lube Oil Coolers—The Sims Co.
Turbochargers—Elliott-Buchi.
Generator and Exciter—Electric Machinery Mfg.
Centrifugal Blowers—DeLaval Steam Turbine Co.
Lube Oil—Shell Oil Co.
Lube Oil Centrifuges—The Sharples Co.
Lube Oil Meters—Buffalo Meter Co.
Lube Oil Filters—Hilco.
Fuel Oil Filters—Hilco.
Fuel Oil Centrifuges—Sharples Co.
Vapor Phase System—Engineering Controls, Inc.
Intake Air Filters—American Air Filter Co.
Impingement Air Filter—Continental Air Filters.
Intake Air Filters on Engines—American Air Filter Co.
Exhaust Heat Boilers and Silencers—Maxim.
Mercoid Controls on Engines—Detroit Lubricator Co.
IMO Pumps (Lube Oil) — DeLaval Steam Turbine Co.
Lubricators—Manzel Inc.
Valves—Crane Co.
Volume Regulators on Blowers—Askania Regulator Co.
By-pass Valve—Fulton-Sylphon.
Flexible Connections—Zallea Bros.
Fuel Oil Filters—Cuno Engineering Co.

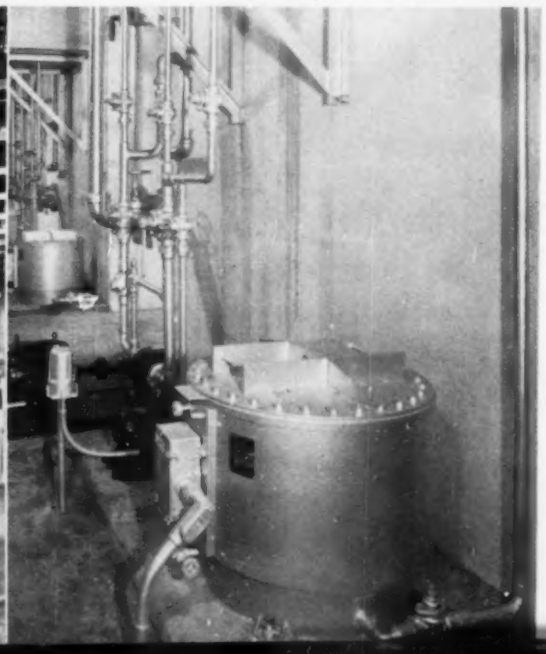
Photography—Industrial Photo Service.



From left to right, two Sharples lube oil centrifuges, lube oil tank, Hilco fuel oil purifiers, two Sharples fuel oil centrifuges and water softener.



In foreground is one of nine Sims lube oil coolers where engine lube oil is cooled to 135 degrees Fahrenheit.



Four of nine Hilco lubeoil filters with a motor driven pump so arranged that the suction can be drawn from either the return compartment or feed compartment of the lube oil sump tank.

DUAL-FUEL UNIT IN CONSTANT SERVICE LEADS REA SYSTEM IN FUEL ECONOMY

480-hp. Fairbanks-Morse Engine at Hugo, Colorado, Cuts Fuel Costs $10,000.00 a Year, and Achieves Lowest Operating Costs of K. C. Electric Cooperative Three-plant, Nine-engine Generating System.

By WM. H. GOTTLIEB

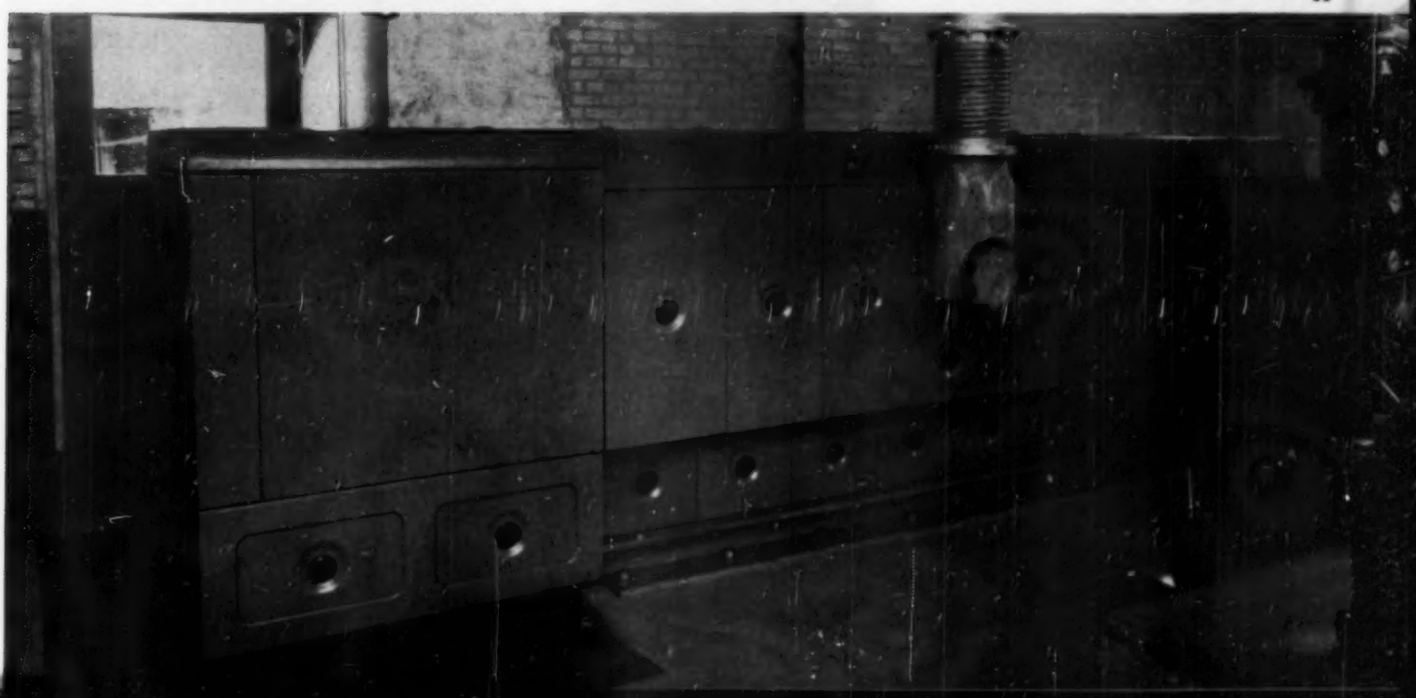
ONE 480-hp. Fairbanks-Morse engine in almost continuous operation has been carrying nearly 40 per cent of the entire load on the three-plant, nine-engine system of the K. C. Electric Association. There is a good, sound reason for heaping this disproportionate share of the work on one engine—the unit is the most economical in all three plants, has cut the cost per kilowatt-hour by more than 5 mills and will save this Colorado REA cooperative more than $10,000.00 a year. Provision of electric service for the sparsely populated lands of the west has always been a physical and economic problem. Some of the small towns, like Hugo, Colorado, set up small municipal power plants. Later, a private utility acquired the plants at Hugo, Stratton and Cheyenne Wells and serviced those and other towns in the area. Finally, in an effort to extend service to the isolated farms and ranches, an REA cooperative was formed to take over and extend the utility system. This provided not only generating facilities but a base load of small municipalities.

The K. C. Electric Association started operation on September 10, 1948, with large vistas and responsibilities. It proposed to serve more than 6,000 square miles of territory in East Central Colorado, including all of Kit Carson and Cheyenne Counties and much of Lincoln County. The distribution problem is evident in the fact that this large area has only about 15,000 population. The plan called for an eventual 2,200 miles of line serving the rural population and every town except Burlington. By the end of the first year, the Co-op was serving successfully the important nucleus of the system: 1,780 consumers in ten towns.

In the initial purchase, the Association acquired nine diesels in three plants. There were three Fairbanks-Morse units at Stratton, a 300-hp. Model 32E14, an old 360-hp. Model VA, and a new 300-hp Model 31A8½ en bloc engine. At Cheyenne Wells, there were four diesels, including a 150-hp. McIntosh & Seymour unit, and three Fairbanks-Morse engines rated at 300-hp., 240-hp., and 75-hp. At Hugo, there were two Fairbanks-Morse units, a 200-hp. Model Y and the newest and largest prime mover in the system, a 480-hp. Model 31AD8½ dual-fuel engine which had started service in August, 1948, just a month before REA took over. Normally, this 8-cylinder, 8½-in. bore by 11½-in. stroke, 514-rpm. engine is rated at 520 hp., but it was derated for this installation to allow for the 5,034-foot elevation at Hugo. It drives directly a 412-kva., 330-kw., 3-ph., 60-cycle, 2,400-volt Fairbanks-Morse alternator with 5-kw. direct-connected exciter. The new unit was equipped to burn natural gas with a small charge of oil as pilot fuel but was operated as a full diesel until a gas supply could be arranged. The engine's efficiency as a diesel caused operators to keep it in service fully 75 per cent of the time and it generated more than 20 per cent of the total power production of the system. With fuel as high as 12½ cents a gallon, the engine produced a kilowatt-hour for a fuel cost of 9.4 to 10.1 mills.

In mid-April, the operator moved a lever and the engine switched to natural gas fuel. Gas prices were high, too, ranging from 27.92 cents to 33.77 cents, but it was still a cheaper source of Btu's than was oil. In May, the first full month of dual-fuel operation, the fuel cost per kw. hr. was down to 4.3 mills, and by September this had been cut to a flat 4 mills. Table I gives detailed operating figures for five months on oil, the changeover month and five months on gas. With operating costs more than 5 mills lower than those of any other unit in the system, the dual-fuel engine was ordered into continuous service. For 18 hours a day, the engine carries 270 kw. with the governor blocked to limit load to that figure. For the remaining 6 hours, from midnight to 6 a.m., the unit carries the entire system, running with the governor free.

In the first five full months of operation on natural gas, the engine ran 3,571 hours out of a pos-



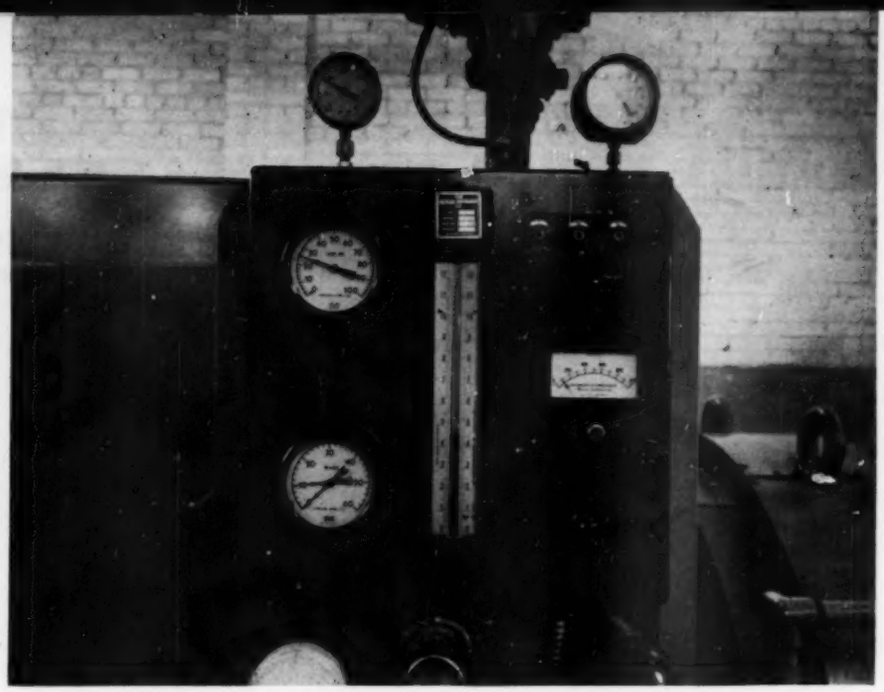
The Fairbanks-Morse dual-fuel unit at Hugo is producing a kilowatt hour for a fuel cost as low as 4 mills and will save the Association $10,000 a year.

sible 3,672, more than 97 per cent of the time. It was shut down only for precautionary maintenance. During this period, this single unit generated nearly 40 per cent of the total production of the entire nine-engine system. Based on this production, the dual-fuel engine is saving more than $10,000 a year as compared with the most economical generating costs in either of the other two plants. Fuel oil is trucked to the plant and stored in a 10,000-gal. tank above ground, from which it flows by gravity to two 325-gal. day tanks in concrete pits. Engine supply pumps draw fuel from the day tanks and put it through a duplex bag-type filter and then a duplex micronic paper filter. The fuel injection pump for each cylinder of the Model 31 engine includes a big plunger for full diesel service and a small plunger for accurate metering of pilot charges during dual-fuel operation. The same injection nozzle is used for both. Natural gas, with a heating value of 992 Btu. per cu. ft. at atmospheric pressure, reaches the plant at 42 psi. It passes through a meter and then a regulator which cuts pressure to 22 psi. and enters the gas header through a governor-regulated admission valve. It is the pressure in the header, controlled to meet load conditions, that determines the quantity of gas admitted to the cylinders. Gas passes from the header into the cylinders through constant-lift, cam-operated valves.

All bearings are lubricated by a pressure system and lube oil also is used for cooling the pistons. Included in the circuit are an engine-driven pump and a shell-and-tube oil cooler. A motor-driven auxiliary lube pump is used in starting and shutting down the engine. Some oil is taken from the pressure side of the main lube pump and put through an activated clay filter. When the engine ran as a full diesel, the filtration elements were changed once a month. With the engine burning gas, the elements last two full months. Cooling water is circulated through the exhaust header jacket and cylinder jackets by an engine-driven centrifugal pump and is cooled in a shell-and-tube heat exchanger. A motor-driven centrifugal puts well water through the exchanger to waste. An automatic thermostatic valve regulates jacket water temperature by by-passing jacket water around the heat exchanger.

Scavenging air is drawn through an oil bath filter in a sheet metal air house near the plant and is supplied to the cylinders by a positive-displacement air pump incorporated in the engine. Exhaust gases vent through a vertical silencer outside the plant. A compact gauge board mounted right beside the engine holds a multi-point exhaust pyrometer and gauges and alarms on water temperature and lube pressure and temperature. For additional protection, there is an automatic shutdown device activated by failure of lube, water or fuel pressure.

In spite of high fuel prices which necessitated a fuel clause charging 1 mill per kw. hr. for each cent above 6 cents per gallon, K. C. Electric has been able to charge rates equal to or lower than those of comparable communities in the area. Today, dual-fuel savings are being passed on to the consumer. Already, this one hard-working, efficient dual-fuel engine has reduced the consumer rate 2 mills per kw. hr.



A compact gauge and alarm panel is mounted at the side of the dual-fuel engine. The panel includes an Alnor exhaust pyrometer. ◆

◆ Lubricating oil at Hugo is cleaned continuously by a Hilco Hyflow filter. At right is the Ross lube cooler heat exchanger. Both lube and water temperatures are regulated by Sylphons.

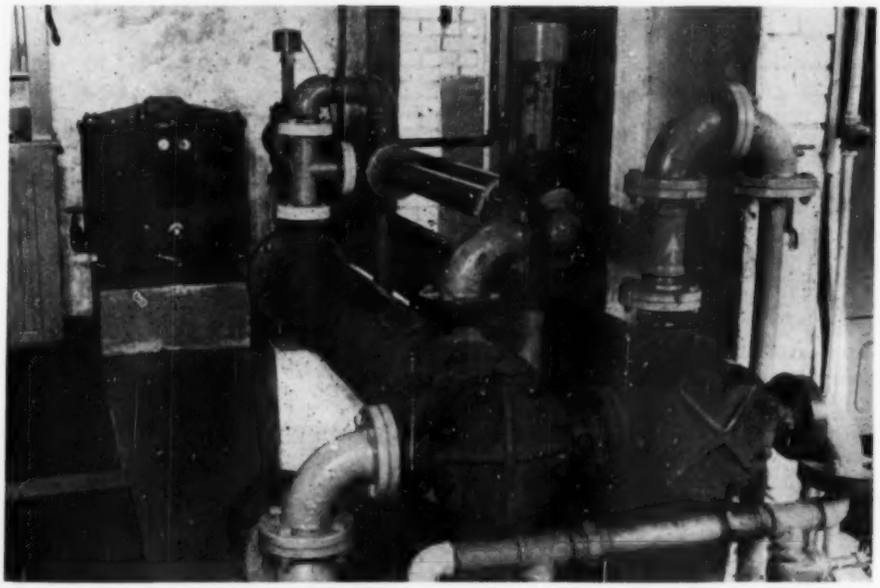


TABLE I—PERFORMANCE OF NEW ENGINE AT HUGO, COLORADO FULL DIESEL AND DUAL FUEL

	Kr. Hrs. Generated	*Fuel Consumed* Gals. Oil	MCF Gas	Lube	*Hrs. Operated*	*Cost Fuel per Kw. Hr.*
1948						
November	97,110	7,850		60	466	.0099
December	98,500	7,870		100	453	.0100
1949						
January	94,500	7,650		70	444	.0101
February	120,000	9,778		120	623	.0100
March	136,500	11,298		173	736	.0094
April	125,500	4,153	985	189	588	.0064
May	160,800	1,922	1,685	170	698	.0043
June	164,400	1,891	1,726	220	704	.0042
July	191,600	1,928	2,104	150	725	.0041
August	191,200	1,976	2,298	145	736	.0044
September	187,900	1,804	2,029	140	708	.0040

TABLE II – FIRST YEAR OPERATING AND COST RECORD

		1948			1949								
		Sept.	*Oct.*	*Nov.*	*Dec.*	*Jan.*	*Feb.*	*March*	*April*	*May*	*June*	*July*	*Aug.*
HUGO	Kw. Hr.	68,200	99,500	98,580	99,190	95,200	121,540	137,600	140,880	168,360	173,830	195,660	192,890
	Fuel	6,117	7,823	7,834	7,994	7,770	9,953	11,444	6,640	2,814	2,884	2,368	2,164
	Lube	70	115	72	80	75	139	184	351	267	305	194	161
	Engine Hours	312	453	485	465	450	638	747	746	792	794	764	754
	Cost, Fuel	762.42	979.91	985.05	1007.64	970.16	1240.24	1391.59	1093.57	802.11	811.57	850.01	877.21
	Cost, Lube	35.00	57.82	36.20	39.08	36.64	67.91	86.63	165.74	126.32	144.42	93.45	77.55
	Cost, Labor	384.80	540.30	588.50	558.10	556.25	682.95	761.35	875.15	860.60	833.00	861.40	1063.75
	Other Operating Expenses	.....	.....	37.88	104.02	151.35	209.87	81.53	134.66	114.33	79.56	102.57	62.77
	Maintenance	.....	.....	30.70	20.90	46.20	117.40	39.75	26.58	66.02	108.73	51.98	342.96
	Total Operating Costs	1182.22	1578.03	1678.33	1729.74	1760.60	2318.17	2360.85	2295.70	1969.38	1977.28	1959.41	2424.24
STRATTON	Kw. Hr.	135,700	185,000	182,700	205,200	210,900	139,200	142,900	125,600	108,700	101,300	141,700	127,200
	Fuel	12,527	15,810	15,975	18,196	18,595	12,518	13,207	11,106	10,135	9,019	13,023	11,448
	Lube	240	331	351	300	273	195	225	175	161	135	208	175
	Engine Hours	1,154	1,671	1,600	1,694	1,716	1,230	1,307	1,077	982	870	1,150	1,083
	Cost, Fuel	1469.42	1857.68	1892.72	2156.95	2186.40	1454.72	1520.13	1226.10	1079.38	945.19	1319.23	1141.37
	Cost, Lube	121.68	168.57	177.74	150.58	137.33	96.23	111.15	87.64	80.00	67.32	103.44	87.82
	Cost, Labor	526.70	830.50	833.88	794.22	857.90	728.40	787.50	766.55	699.75	607.50	713.70	533.45
	Other Operating Expenses	4.07	.....	71.76	35.53	53.44	46.58	15.50	103.69	37.27	45.99	80.83	65.26
	Maintenance	34.20	.....	8.03	45.83	41.45	92.54	303.35	44.14	51.73	29.60	20.50	8.80
	Total Operating Costs	2156.07	2856.75	2984.13	3183.11	3276.52	2418.47	2717.63	2228.12	1948.13	1695.40	2237.81	1836.70
CHEYENNE WELLS	Kw. Hr.	82,785	125,050	121,070	131,100	137,785	122,035	133,300	127,580	129,115	135,220	170,200	146,300
	Fuel	7,927	12,110	10,810	12,025	12,310	11,411	11,994	11,424	12,798	12,262	16,329	14,016
	Lube	78	108	102	125	129	124	138	149	157	153	187	161
	Engine Hours	831	1,164	1,128	1,188	1,266	1,113	1,237	1,209	1,208	1,230	1,596	1,302
	Cost, Fuel	880.69	1370.73	1226.50	1359.62	1371.58	1264.22	1296.55	1183.53	1286.20	1216.39	1497.37	1262.84
	Cost, Lube	40.15	55.16	52.43	64.28	66.62	63.54	71.00	76.66	81.05	78.72	95.95	83.91
	Cost, Labor	543.40	801.05	750.85	759.65	735.65	679.00	647.55	821.00	808.00	792.60	827.80	841.35
	Other Operating Expenses	.....	.....	.....	78.00	35.71	46.38	16.15	36.75	17.98	18.75	63.19	52.11
	Maintenance	.....	.....	11.47	145.79	70.95	38.00	77.23	.61	187.66	15.83	53.20	103.12
	Total Operating Costs	1464.24	2226.94	2041.25	2407.34	2280.51	2091.14	2108.48	2118.55	2380.89	2122.29	2537.51	2343.33

High-Speed Diesels . . . Design, Operation & Maintenance

CONDUCTED BY H. G. SMITH

Cooling Systems – Coolant – Inhibitors

THERE is still considerable educational work to be done on cooling systems of high speed diesel engine installations, and for this reason this column has been discussing the subject for several successive issues. Some of the points discussed can be found in standard service manuals issued by the various manufacturers, but it is the writer's object to outline some facts and information that extend beyond the usual instructions.

The source of water is an extremely important factor to successful cooling systems, yet it is only mentioned very briefly in service books. Above all, clean water should always be used in cooling systems. This is not such a serious problem to the operators who have city water available at all times, but many off-highway operations are seriously handicapped and find clean water at a premium. Even some clean waters are unsuitable because they are high in bicarbonates and sulphates of calcium and magnesium salt. The bicarbonates are referred to as "temporary hardness" factors and the sulphates as "permanent hardness" factors. Boiling will precipitate bicarbonates from the solution and form scale and sometimes sludge. Water may sometimes contain hydrogen sulphide. This is the substance which causes the water to have a "rotten egg" smell and such waters are extremely corrosive to copper and copper alloys, the materials used in radiator construction.

Natural water supplies may often contain carbon dioxide, which has been caused by contact with decaying organic matter and which is in itself corrosive. Oxygen is one of the more active elements and is exceedingly corrosive to iron and steel. It is almost always present in air which is entrained in surface waters such as lakes and rivers and is caused by atmosphere contact during turbulent flow or turbulent weather conditions. Shallow wells also may contain dissolved oxygen. All waters have the natural tendency to combine chemically with iron and air in the cooling system. This chemical action forms rust and causes corrosive damage to all metal parts. When two different metals, such as iron and copper, are placed in contact with each other and immersed in water containing salts, etc., electric currents flow through the water from one metal to the other in exactly the same manner as in a battery and a corrosive action called electrolysis takes place. Although these currents are very weak, over a period of time they may cause localized corrosion that weakens, pits, and sometimes eats completely through the metal. Electrolytic corrosion in the cooling system can result from a combination of different metals in contact with eacH other, such as the soldered seams in copper or brass radiators, brazed joints in steel tubes, copper gaskets in contact with iron, and imperfect plating on thin steel parts.

The rate of rust formation and corrosion within the cooling system is influenced by many conditions of service and operation. Aeration (mixing air with water) can increase corrosion of iron as much as 30 times. The normal source of aeration is the radiator top tank. At high speed of the engine, and particularly with low coolant level, the rush of coolant into the radiator is great enough to drive air into the liquid and carry air bubbles down through the radiator tubes. If the coolant level is allowed to drop as low as the top of the water tubes, suction of the water pump will draw air down through the water tubes. Air can also be sucked into the system when the engine is running, through points of leakage on the suction side of the pump. Heat speeds up corrosion and unfortunately the rate of corrosion with iron appears greatest at coolant temperatures corresponding to best engine performance. Iron, solder and copper will corrode more than twice as fast at 175°F. temperature than at 70°F.

Coolant may become contaminated as a result of extended service, a faulty condition within the system or from improper maintenance. Combustion gas dissolved in the coolant from a leaky cylinder head gasket has a similar effect to aeration. Corrosive contamination of coolant can also result from failure to neutralize and flush out any cleaning compound used in cleaning the system. If rust deposits are allowed to build up in water passages of the block or head of the engine, they may hold enough heat in the metal to create local "hot spots," especially around valve seats. Steam pressure from such local hot spots will cause boiling and is a common cause of overflow loss.

Rust deposits have their most harmful effect in the radiator. Even a small amount of fine rust particles continually circulating through the radiator has a tendency to plate out in the form of a thin hard scale on the inside of the narrow water tubes. This scale first reduces cooling efficiency of the radiator by insulating the tubes from the coolant. As more rust becomes lodged in the tubes, circulation is restricted and clogging may progress to the point where coolant will be forced out of the overflow pipe. When boiling starts large amounts of rust are stirred up in the water jacket and carried over into the radiator and will eventually plug it up solid.

A rusty cooling system may seem to function satisfactorily under moderate operating conditions, but will fail to cool the engine under more severe conditions, often just at the time when full power output is most urgently needed.

Since it is quite difficult to tell whether the water being used is satisfactory, the procedure to follow is: be sure the water used is clean and then use an inhibitor. Laboratory tests show that a good corrosion inhibitor in the water in the right proportion reduces the normal rusting at least 95 per cent. There are two types of water inhibitors in general use – soluble oils and salts. For best results, both types should be used only in proportions recommended by their manufacturer. Corrosion inhibitors *do not* remove rust already formed in the system and any necessary cleaning out of the rust should be performed before the inhibitor is installed. Mixing different types of inhibitors in the cooling system, and the use of inhibitors that cause foaming and overflow loss should be avoided.

Treatment of water for rust prevention can best be accomplished in the cooling system itself. Starting with the system clean, simply fill it with the recommended dosage of inhibitor and then fill with fresh clean water. Operate the engine until it reaches driving temperature (cover radiator if necessary), to open the thermostat and establish circulation through the radiator and engine block for complete mixing. Since the inhibitors are included in most antifreeze compounds, no inhibitor of any kind should be added to fresh antifreeze solutions. However, corrosion inhibitors may weaken and, in time, be exhausted by use. When this occurs the solution generally becomes unusually rusty and should be discarded.

Where antifreeze has been used drain the solution in the spring after freezing weather is past, flush the system thoroughly and clean if necessary, then

. . . *and now please turn to page 64* . . .

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● The result of Auto-Lite's 39 years of automotive electrical experience, Auto-Lite Diesel systems are complete from generator to voltage control to battery to starter. The dependability of Auto-Lite electrical units in service has made Auto-Lite the world's largest independent manufacturer of automotive electrical equipment. Engineers and executives are invited to consult with us on Diesel cranking and generating equipment.

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Money cannot buy better diesel equipment . . .

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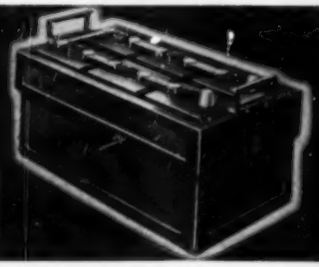
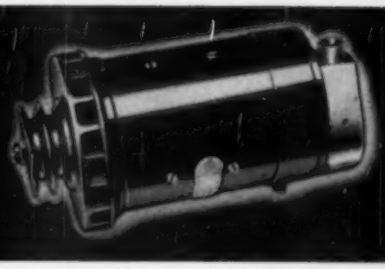




STARTERS
BATTERIES
GENERATORS

"Cat" DW20 with W20 wagon is especially designed to meet long haul requirements with big capacity high speed features.

Working on the Garza-Little Elm Flood Control Dam and reservoir northeast of Lewisville, Texas, DW20 with W20 wagon averaged 22-25 cu. yds. per load on a 6,500-ft. haul from Borrow pit to fill.

PRODUCTION of the two new high-speed, long haul and high-capacity earthmoving machines is announced by Caterpillar Tractor Company, San Leandro, Calif. The new units, a four-wheel diesel tractor-wagon combination, the "Cat" DW20 tractor with W20 wagon; and the powerful two-wheel diesel prime mover, the "Cat" DW21 equipped with the No. 21 scraper, are scheduled for production late this fall. These two new machines, the result of five years of intensive research, design engineering and job-proved application, offer the heavy construction contractor a complete equipment package specifically designed to meet their needs in each zone of operation. They also provide contractors with a single source of manufacture, parts and service responsibility.

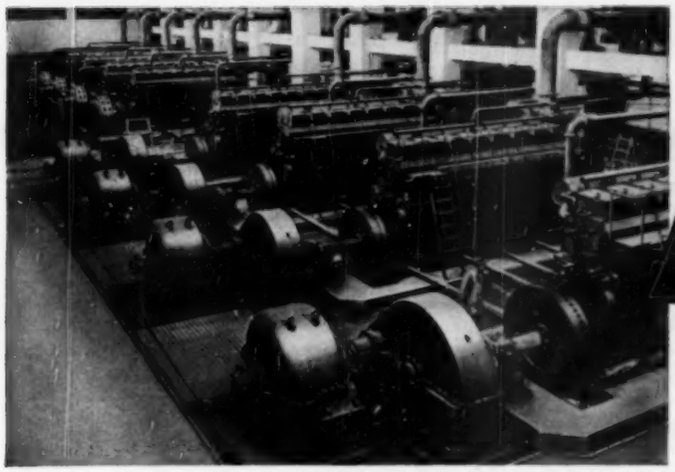
With the announcement of these high-speed units, Caterpillar Tractor Company now offers standardized equipment for zoned operations. Machines now available include the high-speed, rubber tired, large capacity units for long haul and pusher loading operations—track-type tractor and scraper combinations for rough ground conditions that require power in place of speed—track-type tractor and bulldozer units where traction is needed for leveling, spreading and for pioneering work. These machines, combined with the power zone compressors, shovels and draglines powered by Caterpillar diesel engines, complete the standardized zone package tailored to meet the needs of contractors for any job.

In addition to the W20 wagon, the four-wheel DW20 tractor will also be available with a No. 20 scraper and a No. 20S bulldozer. The new No. 27 rear double-drum cable control unit will be offered to operate the bulldozer. Both the DW20 and DW21 prime movers have the new six-cylinder "Cat" diesel engine rated at 275 hp. peak capacity at 2,000 rpm. and 225 hp. at 1,900 rpm. available at the flywheel. The new engine has a 5⅛x6-inch bore and stroke with 743 cu. in. piston displacement. A governor is provided to control low idle speeds and to prevent over speeding of the engine. All working speeds are controlled by means of a foot throttle.

Each unit has the Caterpillar constant mesh spur and helical gear transmission, pressure lubricated, and a 16-inch diameter double plate clutch with semi-metallic friction surfaces. It is foot operated with air power booster. Each unit has a full floating 4½-inch diameter rear axle. An independent 2-cylinder gasoline starting engine with a simple 6-volt electric starting system is provided as standard equipment.

The DW20 4-wheel tractor has five forward and one reverse travel speeds. Forward travel speeds range from 2.88 mph. in first gear to 26.60 mph. in fifth gear. Reverse speed is 3.72 mph. The 4-wheel tractor has a wheelbase of 128 inches with the front tread at 88 inches. Over-all length of the tractor with matched wagon is 45 feet 8 inches, height is 10 feet 2 inches. The bottom dump W20 wagon has a struck capacity of 17 cu. yds. and a heaped capacity of 25 cu. yds. Doors are hydraulically controlled with a positive mechanical lock. High strength steel and all-welded construction are features of the wagon body.

EXCEPTIONAL LOW POWER COST for huge new Los Angeles sewage disposal plant



Nine Supercharged, Dual Fuel Worthington Engines, of 1688 hp each, installed at the new Hyperion Sewage Treatment Plant, Los Angeles, California

Worthington Supercharged Dual Fuel Engines to Supply 15,000 hp . . . for only the cost of pilot fuel!

Now being built at a cost of approximately $41 million, Los Angeles' new Hyperion sewage disposal plant will be the most modern and efficient in the world. Designed to handle an average daily flow of 245 million gallons of raw sewage, this modern "high-rate" plant will feature the most advanced engineering in every detail of operation.

Nine Worthington Dual Fuel engines are to be the entire power source. Five will drive generators, and the other four will drive blowers. The Hyperion plant will operate at exceptionally low cost, thanks to: (1) the Worthington-pioneered dual fuel principle, permitting the use of gas, oil, or gas and oil in any ratio; (2) supercharging, which provides maximum power for available space, and with the utilization of high-temperature water cooling and exhaust heat recovery system, results in highest thermal efficiency.

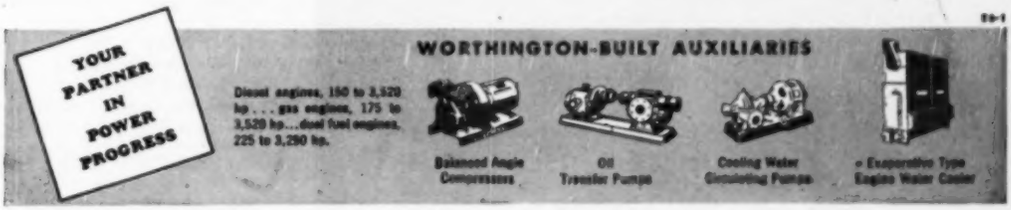
SEWAGE GAS THE FUEL

These Worthington engines will normally run on raw sewage gas, utilizing pilot oil to ignite the gas. *Fuel expenses under ordinary conditions, therefore, will be only the cost of pilot oil.* However, should there ever be a shortage of sewage gas, the engines will automatically shift to oil fuel, in the necessary ratio. This gas-oil ratio can also be controlled manually.

FOR EVERY SIZE OF PLANT

In addition to Dual Fuel Engines, Worthington makes a wide range of Diesels, pumps, comminutors, and other equipment, to meet the requirements of sewage treatment plants of every size from the smallest to the largest. For further facts on the trouble-free, cost-saving engine performance that proves *there's more worth in Worthington*, write to *Worthington Pump and Machinery Corporation, Engine Division, Buffalo, N. Y.*

WORTHINGTON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Cooling Water Circulating Pumps
Evaporative Type Engine Water Cooler

Supervising & Operating Engineers Section

CONDUCTED BY R. L. GREGORY

DUAL FUEL UNITS PAY OFF AT SPRINGFIELD, COLORADO

IT always affords the writer a lot of pleasure and satisfaction to call upon plant superintendents, especially those who are new in the field, and to compare notes and exchange ideas on plant operation and maintenance. Several such opportunities were taken advantage of by the writer on a recent trip through the western states. Some of the facts gleaned from these visits were so interesting that we are passing them on for our readers' information.

One of the most interesting of the plants visited was that of the Municipal Utilities of Springfield, Colorado, whose genial superintendent, Mr. M. L. Shettron, spent some time going over his plant and cooperating with the writer on records and plant data. From the following it can be easily understood why this plant has been a success from the start, since Mr. Shettron is a firm believer in accurate records and data. The city of Springfield has a plant that its citizens can be proud of, and Mr. Shettron and the city fathers are to be commended upon the fine job they have done in a remarkably short time.

For some time the citizens of Springfield felt that their power and light requirements could be best obtained through the medium of a municipally owned power plant. Therefore the Springfield Electric Utility had its beginning, when the electorate voted in May, 1947, authorizing a bond issue in the principal amount of $290,000 for building and equipping the plant and the construction of a distribution system.

Construction was started in April, 1948, and the plant went into actual operation on March 2, 1949. By May 1st of that year a total of 567 customers were connected to the system. By May 1st of 1950 a total of 725 customers were being served by the plant. Being located in the heart of an agricultural and cattle raising district, there is a dearth of industry in Springfield, hence practically the entire output of the plant is consumed by domestic and commercial users, power users being practically nil.

As is the case with most new plants, there were several "kinks" and mistakes which had to be corrected before the plant could be operated on an economic basis, but Mr. Shettron now has these well in hand, as can be attested to by his report for the first fiscal year's operation, which will be given later. The city fathers did not spend a lot of money in the housing of their plant, yet they have a good substantial and adequate building for that purpose, which allowed them to spend more money on equipment and distribution lines.

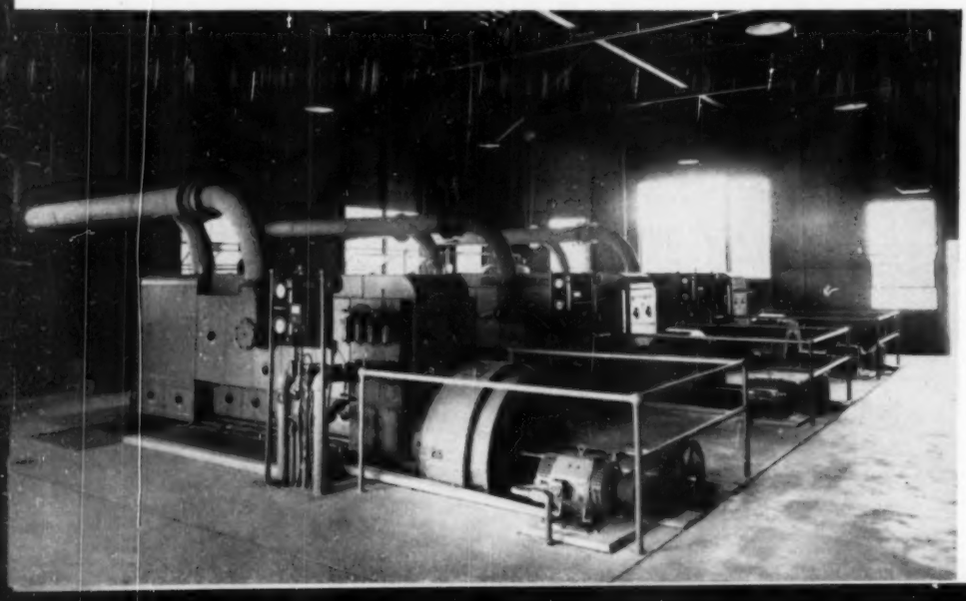

Illustration shows the dual-fuel units, which consist of three Fairbanks-Morse Model 31A8½D engines, 5-cylinder, 4-cycle, 8½-inch bore by 11½-inch stroke, 514 rpm., and rated at 325 bhp. at sea level or 293 bhp. at site level of 4,400 feet above sea level.

The generators are Fairbanks-Morse, rated at 200 kw. at site elevation, 2,300-volt, 3-phase, 60-cycle. Exciters were also furnished by Fairbanks-Morse. Woodward governors and Alnor pyrometers are used, with fuel and lube oil filters by Hilco. The air filters were furnished by American Cycoil and the silencers by Maxim. The fuel liquid level gauges were furnished by the Liquidometer Corporation, all other pressure and temperature gauges being Marshalltown.

To attest to a job well done, we present the financial statement of the plant for the fiscal year from March 1st, 1949, to February 28th, 1950.

INCOME

Generation — 1,362,813 kwh. sold to customers at an average rate of $.04138 per kwh.	$56,399.18
Total Income	$56,399.18

EXPENSE

Production expense	$23,905.60	
Distribution expense	8,183.89	
General expense	6,863.26	
Total Expense	$38,592.75	$38,592.75
Total Profit		$17,446.43
Total expense per kwh. generated		$ .02858

PLANT DATA

Gallons of fuel oil used	53,442
Cost $.09358 per gal.	
Cubic feet natural gas used	17,309,000
Cost $.16743 per M cu. ft.	
Lube oil used	2,099
Cost $.50429 per gal.	

(Considering the expense of additional costs in getting the plant into operation and correcting plant and distribution faults, the net return profit shown is a fair return. The plant is now netting approximately 40 per cent of the gross.)

Engine efficiency is 14,600 btu. per kwh. generated.

DAILY OPERATING LOG

Ports Cleaned	
Fuel Nozzles Checked	
Gas Valves Checked	
Pistons Pulled	
Heads Scaled	

Unit Number _____ H. P. _____

Day Ending Midnight _____

Fuel Filters Changed	
Lub. Oil Filter Chgd.	
Lub. Oil Strainers Clnd.	
Air Filters Cleaned	
Heat Exchangers Clnd.	

	ENGINE													SWITCHBOARD								Fuel & Lub.
	PYROMETER					Soft Water			Raw Water		Lub. Oil		Serv. Air.	A C Ammeter			D. C.		Load			Filters*	
Hour	1	2	3	4	5	Cyler Element	Inlet Temp.	Outlet Temp.	Press.	Temp.	Press.	Temp.	Press.	Press.	1	2	3	Volts	Amps.	W.H.M.	P. F.	W.M.	Temp.	Press.
1AM																								
2AM																								
3AM																								
4AM																								
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9PM																								
10PM																								
11PM																								
12Mid.																								

FUEL OIL		NATURAL GAS		LUBRICATING OIL		ENGINE HOURS	
Present Reading		Present Reading		Gallons Added		Present Reading	
Previous Reading		Previous Reading		Gallons Changed		Previous Reading	
Gallons Used		Cubic Feet Used		Gallons Used		Hours On	
Brot. Forward		Brot. Forward		Brot. Forward		Brot. Forward	
Accumul. Total		Accumul. Total		Accumul. Total		Accumul. Total	

KILOWATTS GENTD.				OPERATING COSTS		MAINTENANCE COSTS	
Present Reading				Labor & Repairs		Special Labor	
Previous Reading				Fuel & Gas		Maintenance Labor	
KW Hours Gen.				Oil & Supplies		Repairs	
Brot. Forward				Brot. Forward		Brot. Forward	
Accumul. Total				Accumul. Total		Accumul. Total	

REMARKS: _____

*Once or twice a shift.

Signed _____

at a system load factor of 52.43 per cent. Fuel used is 139,226 btu. on fuel oil and 1,020 btu. on natural gas, coming directly out of the Houghton field. Total capacity of the plant is 514 kw. and firm capacity 356 kw. Peak load to date has averaged 490 kw. with a maximum of 510 kw. Off peak load runs at 120 kw. Average lube oil consumption is 4,240 bhp/hr. per gal. Fuel ratio equals 1 gal. of fuel oil to 911.45 cu. ft. of gas.

From the foregoing data it can be easily understood why the Springfield plant has justified the belief of its citizens in a municipally owned and operated institution.

Another notable feature which the writer was very much interested in was the neat and accurate records which Mr. Shettron has compiled in the first year of operations. They were so arranged and setup that he could instantly give any information asked. While we would like to present some of these forms and record cards, space is limited, so we are merely giving the daily operating log used by the plant. A very concise and complete set of customer's records is kept and a complete rate sheet is available to every customer. All in all, the city of Springfield has done a remarkable job in setting up a municipal utility within the short period of approximately 1½ years.

THOMAS
Flexible ALL METAL
COUPLINGS
FOR POWER TRANSMISSION
REQUIRE NO MAINTENANCE

Patented Flexible Disc Rings of special steel transmit the power and provide for misalignment and end float.

Thomas Couplings have a wide range of speeds, horsepower and shaft sizes:
½ to 40,000 HP
1 to 30,000 RPM

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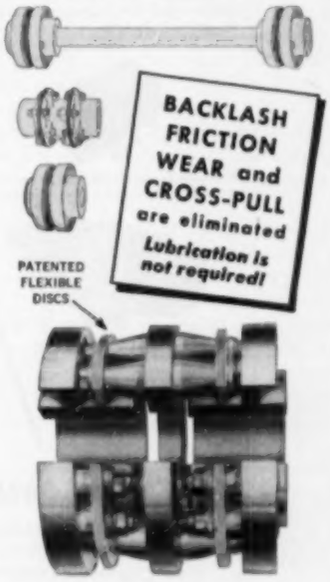

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14 & 28 VOLT SYSTEMS

Generators—14 volt, 40 ampere, low cut-in, and 50 ampere. Standard swivel mounting, as shown, or strap mounting.

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Magnetic Switches for 14-28 volt series-parallel systems and standard 14 volt systems.

Cranking Motors for 14 volt and 14-28 volt series-parallel systems.

Genuine Leece-Neville Costs No More

Owners of diesel equipment can now have a Leece-Neville high-quality electrical system without paying a premium price. With it they get unequalled freedom from maintenance and breakdown expense.

Manufacturers who make Leece-Neville standard equipment find it pays off in sales.

For complete specifications, write Dept. 102, The Leece-Neville Company, Cleveland 14, Ohio

Pioneer and STILL Quality Leader

Leece-Neville

HIGH-SPEED DIESELS

. . . continued from page 58 . . .

install a fresh filling of summer rust inhibitor and water. If leakage and overflow loss of inhibitor solution are kept down to a minimum, one treatment should be effective for the entire warm weather season. If antifreeze is not used, add a dosage of inhibitor to a fresh filling of water both spring and fall.

Inhibitor treatment prevents corrosion and rust formation by chemical action and by depositing a thin protective film on the inside walls of the entire cooling system. In a system that was clean originally the appearance of rust in the radiator is an indication that the inhibitor is weakened from adding water or is exhausted from use. In either case, the solution should be drained, the system flushed and a fresh filling installed.

Corrosion protection is particularly important during warm weather driving when water is used as a coolant, since there is more air in the coolant and more rusting in the system. In very cold weather, control of coolant circulation by the thermostat may reduce the flow into the radiator to only a few gallons per minute and very little air is driven into the coolant. In hot weather, with the thermostat wide open, the flow increases. The installation of a good inhibitor in the cooling water is one of the most essential preventive maintenance services, but also remember—do NOT add any more or less inhibitor than specified by the manufacturer.

New Sales and Service Representatives

Donald D. Fitz, of Des Moines, Iowa, has been named Iowa sales and service representative for the D-A Lubricant Company, Inc., Indianapolis, by Frank L. Binford, president. This company has specialized for more than 25 years in the manufacture and sale of heavy-duty lubricants and engine oils. Mr. Fitz is a graduate of the University of Nebraska. He served with the United States Field Artillery from July, 1941, until March, 1946, leaving the service as a captain. Until his appointment as a D-A representative, he was a salesman in Denver for the Continental Air Lines, and Timpte Brothers, Inc. His business headquarters will be in the Blue Line Storage Co., 200 Elm Street, Des Moines, Iowa.

G.M. Distributor Extends Operation

Taylor Machine Works, Jackson, Mississippi, General Motors diesel engine dirtributor for industrial applications, has recently extended their operation to include GM diesel sales and service to the petroleum industry. The company has been associated with General Motors diesel sales and service since 1940 and their activities cover the State of Mississippi south of and including the counties of Issaquena, Sharkey, Humphreys, Holmes, Attala, Chactaw, Oktibbeha, Clay and Monroe. In addition to the headquarters at Jackson, a branch is maintained at Louisville, Mississippi.

WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **HAMISH FERGUSON**

Hamish Ferguson was appointed Secretary to the Diesel Engine Users Association in London in 1944. Previously senior technical assistant to Diesel and Insurance Consultants, London, and for several years with English Electric Company in the designing and erection of large diesel generating plants. Mr. Ferguson continues to do independent consulting work.

SINCE the earlier reference to the Rover "Meteorite" diesel, the writer has been given the facilities to inspect an engine undergoing load tests. Starting was instantaneous using the Simms electric starter, and the engine was quickly brought up to its full speed of 2,400 rpm. The power was absorbed through a dynamometer and at the rated output of 320 bhp. the exhaust was invisible. The smoothness of running and absence of vibration were exceptionable. Speed regulation is operated by a pneumatic type governor which is connected to a venturi mounted on the induction manifold and no speed variation under constant load could be detected. Two of these engines operating in Thornycroft "Antar" pipe-laying vehicles in Iraq are now reported to have run for some 600 hours each without trouble or overhaul and works tests show that the normal servicing period will be 1,000 hours minimum. It is anticipated that a number of these engines will be undergoing test runs in vehicles in the United States in the near future.

Britain's School of Gas Turbine Technology is re-opening at Farnborough in October. There will be four different types of courses, one of which is an International course designed specially for overseas engineers. The school has a wide range of gas turbine equipment and engines, including test houses and a jet aircraft on which installation and practical ground instruction is given.

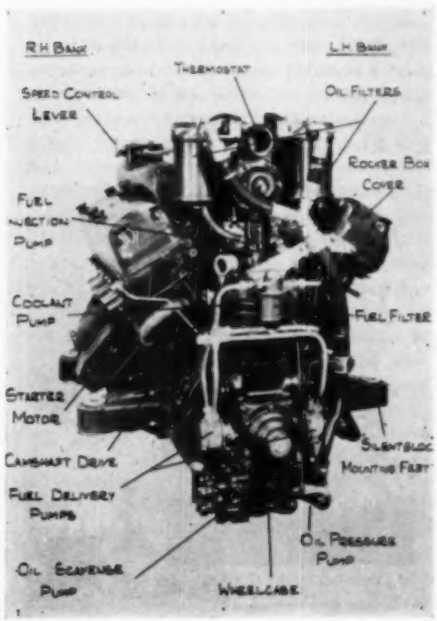
The Commercial Motor Show opens at Olympia, London, on September 22nd, and diesels will be displayed by Thornycroft, Gardner, A.E.C., Leyland, Daimler, Foden, Albion, Dennis, Panhard-Levassor, Meadows, Morris-Commercial, Crossley, Sentinel, Perkins, Rover and Standard. A feature this year will be the increasing number of underfloor horizontals which have been developed.

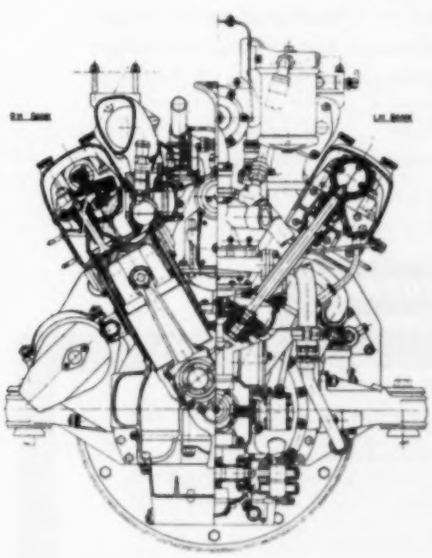
Vickers-Armstrongs Ltd. are developing a track-type tractor for earth moving and heavy agricultural work. It will weigh 15 tons and be powered by a new Rolls-Royce diesel of approximately 180 bhp. at 1,800 rpm. Trials will be carried out during 1951 and it is anticipated that the tractor will be available to the world's markets by January, 1952. Jack Olding & Co. Ltd. of Hatfield have been nominated sole world distributors and they will set up a sales and service organization capable of handling 500 machines per year.

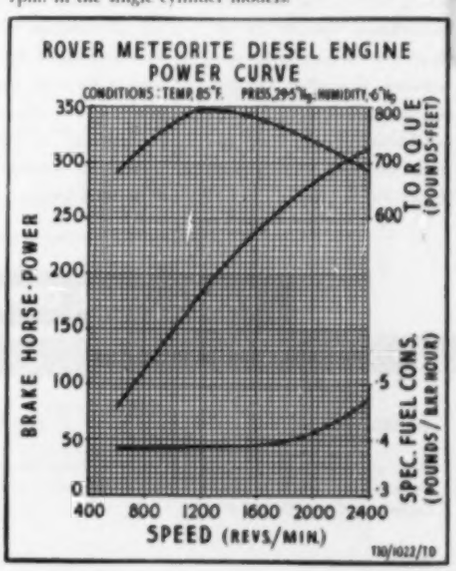
Before representatives of the press and B.B.C. and on television, Leyland's Royal Tiger underfloor-engined bus was demonstrated over what was claimed to be the worst stretch of road in Europe. The half-mile stretch was specially built to reproduce the worst type of Belgium pave in a bad state of repair and with its bumps and pot-holes it is estimated that one mile of the track would be equivalent to 1,000 miles over normal roads.

Six hundred and twenty of these buses are being built for Autobuses Modernos S.A. for operation in Havana and many orders are being accepted.

There are still a number of countries where the "open" type industrial engine is preferred to the totally-enclosed type and to cater to this market Tangyes Ltd. of Birmingham have introduced a new series of horizontal, open-crankcase engines known as the W.H.4. The smallest, with 6¼-inch bore by 10½-inch stroke, develops 14½ bhp. at 515 rpm. while the larger size, with 8¼-inch bore by 14½-inch stroke, develops 25½ bhp. at 370 rpm. in the single cylinder models.







DIESEL ENGINE CATALOG

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Volume Fifteen of the DIESEL ENGINE CATALOG came off the press September Fifth — a complete revision of Volume Fourteen — many new engines, new models, new ratings.

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Entirely revised and re-written, this catalog is a MUST for Design and Operating Engineers. Indispensable to buyers of either engines or accessories. Invaluable to Students and Instructors. Tremendously valuable to all Diesel Salesmen and Accessory Salesmen. In no other book can be found such complete and detailed information on Diesel engines, Dual-fuel engines and Natural Gas engines.

Re-written in its entirety, detailed attention has been given to make this fifteenth edition of the DIESEL ENGINE CATALOG an easy-to-read book. Its comprehensive classification and indexing, all contribute to making it easy for YOU to find what you want in this book. Five books in one with five integral sections, this catalog is indispensable whether for technical reference or selective buying.

The five separate sections break down as follows: (1) An engine section fully illustrated with complete technical descriptions and specifications. (2) An accessory section describing engine and plant accessories. (3) A transmission section describing torque converters, etc. (4) A classified buyers' guide giving you valuable information as to the source of many things you buy in this industry. (5) Advertising section.

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Enter my order today for a copy of the 1950 Diesel Engine Catalog, Volume Fifteen, Edited by Rex W. Wadman, for which I enclose $10.00, also payable at £4-0-0 to E. H. Doddrell, 342 St. Paul's Corner, Ludgate Hill, London E.C.4.

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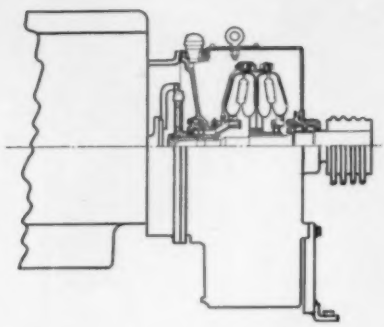
Twin Disc Offers New Coupling



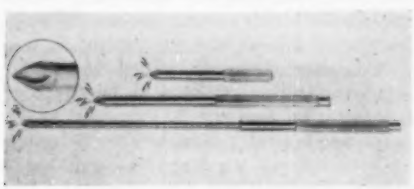
The Twin Disc Clutch Company announces the Model HUD disconnecting hydraulic coupling (patent pending), a new type of hydraulic drive which "dumps" the hydraulic fluid when desired to serve as its own master clutch and provide a complete disconnect between the prime mover and the load. With the exception of provisions for the disconnecting feature, the new unit is similar to other Twin Disc double-circuit hydraulic couplings in both design and operating characteristics. To act as its own master clutch, the new coupling is capable of dumping the hydraulic fluid in from one to four seconds, depending upon the speed of the coupling. When a control valve is actuated to cut off the oil supply the hydraulic fluid is rapidly released into a reservoir through four differential pressure dump valves, which are located in the outer diameter of the coupling.

With the hydro-kinetic connection broken by the absence of the oil, the engine or motor can continue to run indefinitely without harm to the coupling or driven equipment. Special provision is made for adequate lubrication during these periods. When the control valve is reset to again engage the load, ingenious differential pressure valves on the coupling's outer diameter rapidly close. This permits the coupling to quickly refill for normal hydraulic coupling operation. The new coupling is said to save weight and space commonly devoted to a master clutch and to provide all the other advantages of a hydraulic drive, such as smooth pick-up of the load, protection against stalling, and absorption of sudden shocks and overloads. The disconnecting coupling is expected to be of special advantage in logging yarders and loaders; in oil field drawworks, slush pumps and engine compound drives; and in excavating and hoisting equipment. The new Model HUD disconnecting coupling is available in 21-inch and 27-inch sizes, with other smaller sizes to follow. Complete information may be obtained by writing DIESEL PROGRESS, File 62, P. O. Box 8458, Los Angeles 46, Calif.

Horsepower Production for Detroit Diesel

The Detroit Diesel Engine Division's overall production of engines reached 46,000,000 horsepower in July when a 275-horsepower 6-cylinder G.M. diesel engine bound for an Illinois oil field came off the assembly line. This total horsepower, equal to more than seventeen times the ultimate planned capacity of Grand Coulee Dam, has gone into power applications in the industrial, petroleum, marine and transportation fields throughout the world.

New OTC Magnetic Screw Starter



The Owatonna Tool Company announces a new magnetic screw starter that fits all sizes of Phillips, Reed and Prince recessed head screws. The bit is designed to fit No. 1, 2, 3 and 4 Phillips screws as well as corresponding sizes in Reed and Prince screws. The bit on each starter is built of heat treated alloy steel and is permanently magnetized. Three lengths are available: 3-inch (No. 730), for use in close quarters; 6-inch (No. 731), for normal use; and 9-inch (No. 732), to reach inaccessible spots. For further information contact your nearest OTC distributor about the new magnetic screw starter or write DIESEL PROGRESS, File 56, P. O. Box 8458, Los Angeles 46, California.

Publicity Manager at Detroit Diesel

William Fox

William Fox has been appointed publicity manager of the Detroit Diesel Engine Division of General Motor Corporation, according to an announcement made by J. W. Brown, advertising manager. In his new capacity, Fox will conduct field photographic tours and issue product news releases on diesel engines manufactured by the Detroit Division. Fox joined Detroit Diesel in 1942 and has been in the advertising department since 1947. He attended the University of Michigan and has had extensive sales and advertising experience with Detroit manufacturers and advertising agencies.

Here's what you get

with NUGENT FILTERS

for fuel and lube oil

FIG. 1280A *4L

- ✓ More filtering area
- ✓ More effective filtering
- ✓ Choice of full flow or bypass filtering
- ✓ Choice of inexpensive recharges
- ✓ Simple piping
- ✓ Capacities to meet every need

NUGENT Absorbent Type Fuel and Lubricating Oil Filters pay off for you in many ways — they conserve your oil . . . they extend the life and improve the service you get from your equipment . . . they are available at the lowest over all cost per square inch of filtering area. Add to these such additional advantages as ease of installation, economy of recharging and high filtering efficiency and you'll see why we say you can't afford to be without Nugent Filters.

Write today for descriptive literature outlining the nature of your filtering problems. It's the first important step towards big savings.

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OIL FILTERS, OILING AND FILTERING SYSTEMS, TELESCOPIC OILERS, OILING DEVICES, SIGHT FEED VALVES, FLOW INDICATORS

Established 1897

Avondale Launches Large Drilling Barge

One of the largest drilling rig barges designed for tideland waters was launched at the River Plant of the Avondale Marine Ways, Inc. Built for Rowan Drilling Company, Inc., the barge, 200 feet long, 54 feet wide and 12 feet deep, slipped into the muddy waters of the Mississippi River exactly one month after the contract was signed and orders to proceed with construction given. The extremely fast time was possible because of skilled steel workers thoroughly experienced in drill rig construction, working two shifts daily with modern time saving equipment. M. G. Rowe (or Drill Rig No. 14) is the name given this giant drilling rig by Rowan Drilling Company. It is a completely self contained unit, with drilling epuipment and power supply located on the same barge. Designed for economy of operation, all phases of work necessary for successful drilling have been carefully worked out by Rowan and Avondale Engineers and so designed as to eliminate costly and unnecessary effort.

The rig is electrically operated with power furnished by its own generating plant. This plant consists of one 8-cylinder, 650-hp., Superior supercharged engine driving a 400-kw. Westinghouse generator and four additional 6-cylinder, 300-hp., Superior supercharged engines driving four 200-kw. Westinghouse generators. These diesel engines are the type that can be quickly converted to natural gas fuel, any time the drilling location is near a gas field, thereby effecting a large saving in fuel costs. Provisions have been made for installing an additional 400-kw. generating unit at a later date. This power is augmented by an auxiliary electrical plant totaling 190-kw. for lighting, auxiliary pumps and sundry usage.

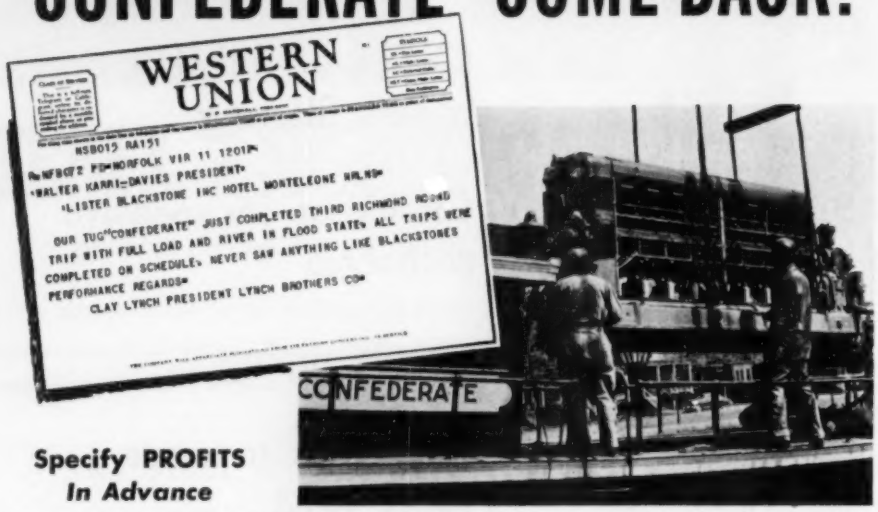
The electric driven drawworks is an Emsco ECA-54, capable of drilling 2½ miles into the ancient formations where oils are found. Mud is supplied by three large pumps, a National E-700 driven by an 800-hp. electric motor and the other two National C-350 pumps, each driven by 400-hp. motors.

Active mud pits with a capacity of 750 barrels and two reserve mud pits of 1,200 barrels each provide an ever present supply of mud. Seven thousand sacks (35 tons) of dry mud can be stored in the dry mud storage compartment. Avondale Marine Ways, Inc., has an enviable record with the oil drilling companies. Rowan's Rig No. 14 is another example of experienced marine men working with experienced oil men to produce better equipment for producing oil. It follows by only a few months another record breaking rig built by Avondale–Rowan Rig No. 13, now drilling in Timbalier Bay, which is the most powerful diesel electric driven drill rig built. Rig No. 13 has a total capacity of 1,845 kw. and is capable of drilling to a depth of 3½ miles. All oil operators remember the *Queen Mary*, the big 170-foot by 74-foot power barge now working the Lake Maricabo region of Venezuela, which was built by Avondale Marine Ways, Inc., for Creole Petroleum Corporation in 1948. And in the past year Avondale built and delivered to Superior Oil Co. the most modern steam power barge afloat. Within a month of the launching date Rig. No. 14 will be ready to deliver to Rowan Drilling Company and Avondale Marine Ways, Inc., will have made another great contribution to solving the problem of obtaining oil from inaccessible regions.

Diesel Order for Baldwin

During recent weeks, the Baldwin Locomotive Works has booked orders for a total of 64 diesel-electric locomotive units. Included are ten 1,000-hp. switching locomotives for the Seaboard Air Line Railroad Company; three 750-hp. switching locomotives for the Youngstown Sheet and Tube Company; five 1,600-hp. all service locomotives and one 1,500-hp. switching locomotive for the Duluth, South Shore and Atlantic Railroad Company; two 1,600-hp. all service locomotives and five 1,200-hp. switching locomotives for the Tennessee Coal, Iron & Railroad Company. Included in the above total are 38 locomotives which have been sold to the Equitable Life Assurance Company for lease to the Baltimore & Ohio Railroad Company. These are divided into fourteen 1,600-hp. road freight units and twenty-four 1,000-hp. switching locomotives.

CONFEDERATE COME-BACK!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LISTER BLACKSTONE INC HOTEL MONTELEONE NRLNS=
OUR TUG"CONFEDERATE" JUST COMPLETED THIRD RICHMOND ROAD TRIP WITH FULL LOAD AND RIVER IN FLOOD STATE; ALL TRIPS WERE COMPLETED ON SCHEDULE; NEVER SAW ANYTHING LIKE BLACKSTONES PERFORMANCE REGARDS=
CLAY LYNCH PRESIDENT LYNCH BROTHERS CO=
CONFEDERATE

PROFITS LAID ON THE LINE! *New, 8-cyl., 320 h.p. Lister-Blackstone Model EPVMDR-8 about to be lowered onto engine bed of the CONFEDERATE. P.S.—The 8 h.p. auxiliary is a Lister-Blackstone, too—naturally!*

Specify PROFITS *In Advance*

When re-engining necessity caught up with the 23-year-old CONFEDERATE her owners, Lynch Brothers, asked for — and got — the answers that everyone wants who is interested in powering or repowering: *How much speed? How much operating cost? How soon will the engine pay for itself?*

Lister-Blackstone laid positive profits on the line practically as soon as the engine was laid on its bed. Re-engining CONFEDERATE now adds an extra round trip every week to those on her former oil-tow schedule between Norfolk and Richmond, Va. *This is real profit "gravy"!*

The wire above is the proof. Ask us for full details, regardless of whether you're interested in a marine or stationary diesel.

LOW PRICES give you biggest diesel value for your dollar NOW —plus outstanding dependability, economy, long life. 3 to 480 h.p. Service and parts from Lister-Blackstone distributors everywhere. Write us your requirements. Address Dept. DP.

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Sold and Serviced in 37 Countries Throughout the World

60-ft., 23-years-young tug CONFEDERATE, with oil barge tow. Owned and operated by Lynch Brothers Towing Co., Norfolk, Va. Re-engined by Lister-Blackstone.

New Diesel Plant Installed in Record Time

Many industrial power units have been changed over from steam to diesel, but few have ever been made under circumstances as compelling and dramatic as those made recently at the Greenville, Texas, Cotton Oil Mill. The mill's steam power plant failed completely. An inspection showed that the 49-year-old Corliss engine had finally given up, and was in no condition to be repaired.

As soon as Hugh Cameron, manager of the Greenville Cotton Oil Mill, and G. A. Ward, superintendent, had made certain that the old Corliss would have to be scrapped, they began planning for a new power plant and called in engineers from Stewart and Stevenson Services, Inc., in Houston. Within only four days after the first meeting with the cotton oil executives, Stewart and Stevenson men, working closely with Cameron and Ward, had developed the engineering plans and specifications for a complete modern diesel plant.

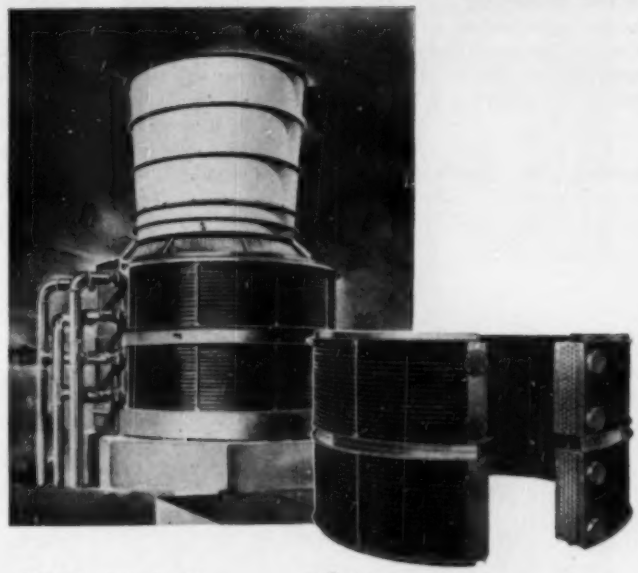
On the forty-second day after the decision to repower with Stewart and Stevenson GM diesels, the new power plant took up the load. The mill was in operation again. The power plant consists of two GM diesel quad units, each rated at 450 hp. for continuous service, or a total combined horsepower of 900. The maximum horsepower rating combined is 1,200 hp. The balance of the power required to run the mill comes from a generator also driven by the GM diesel engines. This generator handles the lights and miscellaneous auxiliary electric load. The GM diesel quad units are unique in that they may be operated on either diesel fuel oil or a combination of diesel fuel and natural gas, thereby insuring the best of economy. A special automatic control was designed by Stewart and Stevenson which flashes a light and rings an alarm in the event of overheating or low oil pressure on the engines. The light remains illuminated, showing the operator exactly where the trouble exists.

Vice President and General Manager at Purolator

James D. Abeles

James D. Abeles, formerly assistant to the president, has been named vice president and general manager of Purolator Products, Inc., Rahway, N. J., manufacturers of automotive oil filters and other filtration equipment of all types, Ralph R. Layte, president of the company, announced recently. Mr. Abeles, who lives in Mendham, New Jersey, has been with the company since 1940. Before becoming assistant to Mr. Layte, he had served as equipment sales manager. Prior to that he had been assistant works manager, assistant plant superintendent, quality manager, and cost reduction engineer. He attended Stevens Institute of Technology and M.I.T.

for Efficient HEAT EXCHANGE

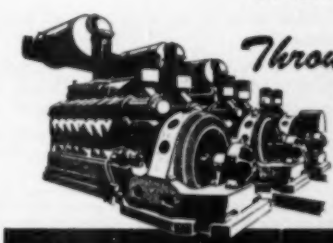


Pictured above is the new Type "E" QUINTAIR *Air Cooled Heat Exchanger*, designed, engineered and manufactured by J. F. Pritchard & Co.'s Equipment Division. Curved Aerofin sections (*see illustration at right*) enable this unit to take maximum advantage of winds from any direction. Especially suited for engine and compressor jacket water cooling.

...Always **Specify AEROFIN**

Regardless of the heat-exchange application — or the operating conditions which prevail . . . regardless of the type of atmosphere or liquid, Aerofin will supply the design and materials best suited to the job.

Aerofin's unequalled experience, research and manufacturing facilities in the heat-exchange field are your assurance of greatest efficiency and longest service life.



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Penn Railroad Increases Diesel Order

Six diesel-electric locomotive units of 1,000 horsepower each for use on the Belvidere-Delaware branch between Trenton and Phillipsburg, N. J., have left the manufacturer's plant and will be delivered to the Pennsylvania Railroad this week, it was announced by Paul W. Triplett, superintendent of the New York Division. As soon as these units are in service, supplementing six of 660 horsepower and two of 1,000 horsepower previously delivered during the past month, all normal freight operations on the Bel-Del will be fully dieselized.

The new locomotives may be coupled together in pairs for use as road engines with heavy freight trains, and for this purpose they have been equipped with special multiple-unit controls, train telephones and cab signal indicators. Being double-ended and capable of operating in either direction, they may also be used for local freight and switching service when needed. These diesel-electrics are part of a $38,000,000 order for 226 new locomotives of several types placed by the Pennsylvania Railroad late in 1949 for delivery during the spring and summer of this year and assignment to various parts of the system. Since the end of World War II, the Pennsylvania Railroad has spent more than $170,000,000 for 820 diesel-electric engines and the facilities for their repair and maintenance.

Pizarro hit the Jackpot

He found Peru in 1532, conquered it, held the Inca chief for ransom and collected gold enough to fill a living room. But he couldn't make it work again.

PORUS-KROME* pays every time

Like the use of unprocessed Diesel liners, Pizarro's one-time method showed a loss. (Secretly, the Incas did away with far more treasure than they paid him.) But PORUS-KROME pays the same high returns, no matter how many times Diesel liners are reprocessed. Each time, they wear up to four times longer than without it.

And think what it saves to have *all* liners *always* standard size.

Along that line, here's a *legitimate* jackpot for you. With VANDERLOY M, even scrap liners come back to original size and give better-than-new service!

Go Pizarro at least one better—investigate today. We're here to help you.

*PORUS-KROME is dense, hard, wear and corrosion-resistant chromium applied by the exclusive Van der Horst process which gives working surfaces an infinite number of tiny oil-retaining reservoirs for perfected lubrication.

VAN DER HORST CORPORATION OF AMERICA • OLEAN, N. Y.

U. S. PATENTS 2,048,578, 2,314,604 and 2,412,698

PORUS - KROME

Good for the Life of your Engines

VAN DER HORST

Eastern Diesel-Electric Locomotive Repair Center

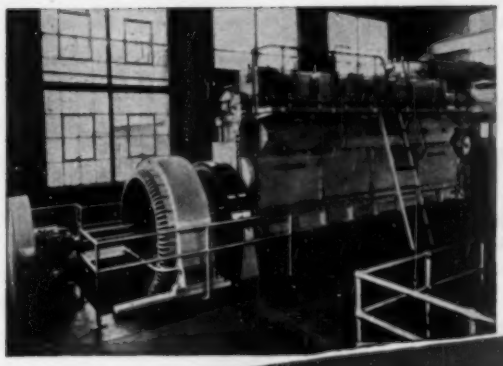
Plans to make Hornell the principal eastern diesel-electric locomotive repair and maintenance center for the Erie Railroad were announced by Operating Vice President R. C. Randall. Mr. Randal said the alterations to existing buildings and the addition of new facilities to accommodate diesel locomotives "are expected to cost more than half a million dollars." Hornell will be the main point for servicing Electro-Motive diesels, including the new 4,500-hp. 2-unit passenger locomotives for through-line trains, purchase of which was authorized by the board of directors at their meeting held in Buffalo August 22. The 3-unit diesels now used on passenger trains will be transferred to freight service.

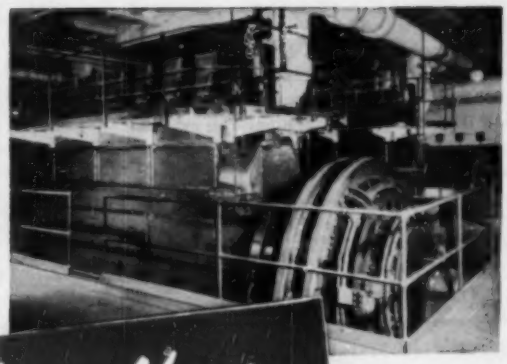
"Although the great motive power revolution that is taking place on the Erie today in changing over from steam to diesels has brought many changes all over the Erie system," Mr. Randall said, "Hornell shops will continue to be an important cog in the machinery which makes the Erie a vital part of America's transportation system." He explained that the increased hauling power of the diesels has made it possible to move longer trains over greater distances before refueling and maintenance than was possible with coal-burning engines. This increased capacity has eliminated the need for many coaling stations and locomotive servicing facilities. Within a few months when delivery is made of diesels ordered in March, the entire territory between Meadville, Pa., and Suffern, N. Y., including branch lines, will be completely dieselized. Steam locomotives will be used in this territory only in emergency, Mr. Randall pointed out.

"By the middle of next year about 95 per cent of our motive power needs will be supplied with diesel locomotives," Mr. Randall said. He referred to the latest $11,000,000 order for 57 diesel units and facilities which was authorized by the Erie's directors at the Buffalo meeting. The new equipment will bring the Erie's growing diesel fleet to 399 units and an investment of more than $56,000,000 during the last six years. It will mean the complete dieselization of passenger trains, with the exception of approximately 50 per cent of the Jersey City area's commuter service. Diesels will handle about 90 per cent of all freight mileage, and more than 98 per cent of yard switching service by mid-1951. In the reassignment of motive power, Hornell will become the home servicing point for all diesel locomotives in through-line passenger service, Mr. Randall said. At the present time passenger diesels are serviced at Marion. All remaining steam locomotives will continue to be overhauled at Hornell Back Shop.

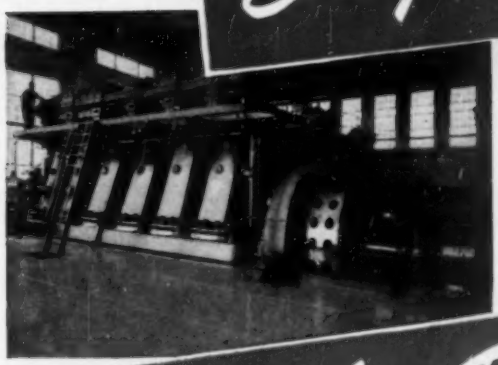
Diesel Order for Mack

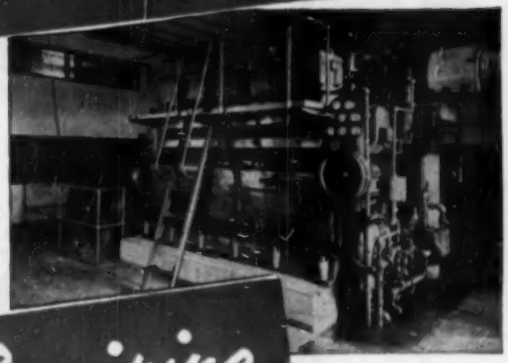
A repeat order calling for sixty diesel-powered C-45 buses has been placed with Mack Manufacturing Corporation by the Trustee of Surface Transportation Corporation of New York. Representing a step in the corporation's long-planned general improvement in its service, these 45-passenger Macks will augment the fleet now operating in the Bronx.





Every One New...





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DIESEL UNITS like these new "big babies" are a vitally important investment to any plant. They deserve and demand only the finest lubrication. Start them off with the right type and grade of oil and they will operate efficiently with little maintenance expense.

Take full advantage of the knowledge and experience of the Cities Service Lubrication specialists. These men are fully informed on the lubrication requirements of all the latest models. Their advice and recommendations can contribute to longer years of use, dependable and economical performance.

Write Cities Service Oil Company, Room 716, Sixty Wall Tower, New York 5, New York.

HELPFUL NEW BOOKLET—FREE!

We have a new 64 page manual entitled "Diesel Engine Lubrication." Write for your free copy of this fact-filled lubrication guide today.

CITIES SERVICE

Diesel Power Plant Operators Meeting

The Oklahoma A. & M. College will hold a three-day conference for diesel power plant operators October 23, 24 and 25, 1950. This conference is being sponsored by the Engineering Extension Division in cooperation with the School of Mechanical Engineering. Most of the talks will be given by men from the diesel engine manufacturing industries. Throughout the conference the solution of practical operating problems will be emphasized. Each of the talks will be followed by a question and answer period. Although this program is planned primarily for operators of stationary diesel power plants such as the municipal diesel power plants and REA diesel power plants, the attendance will not be restricted; and all who are interested in this program are cordially invited to attend. The registration fee will be $10. Applications for registration should be sent to Professor M. L. Powers, Engineering Extension Division, Oklahoma A. & M. College, Stillwater, Oklahoma.

Tentative program: Monday, October 23, 1950—8:00 a.m.: Registration; 9:00 a.m.: Fundamentals of Power Production in a Diesel Engine; 10:30 a.m.: Indicators and Indicator Cards; 1:30 p.m.: Fuel Injection Systems and Problems; 3:00 p.m.: Dual-fuel and Gas Diesel Engines; 6:15 p.m.: Dinner meeting. Tuesday, October 24, 1950—9:00 a.m.: Governors; 1:30 p.m.: Pistons and Piston Rings; 3:00 p.m.: Cooling Systems. Wednesday, October 25, 1950—9:00 a.m.: Recognition of Different Types of Bearing Failures; 10:30 a.m.: Crankcase Explosions; 1:30 p.m.: Panel Discussion of Trouble Shooting.

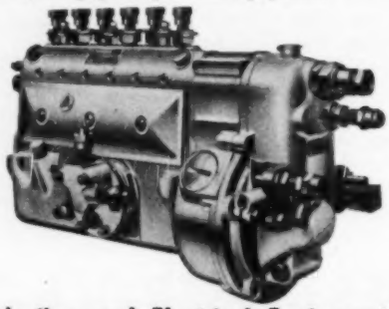
C.A.V. LIMITED SERVICE

Confidence Abroad

Transport operators all over the world have learnt to trust this sign.

In any language the letters on the C.A.V. sign stand for first-rate service facilities, maintained by highly-trained craftsmen, using special precision equipment.

Wherever vehicles fitted with C.A.V. Fuel Injection Equipment are exported — whether to Trondheim, Santiago, Hong-Kong or Sydney—there's a service agent or depot to give it the specialist attention needed for such high-precision equipment.



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Service Depots throughout the World

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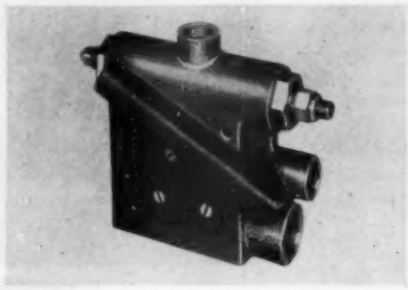
New Hydraulic-Pressure Electric Switch



A new, cartridge-type hydraulic pressure electric switch has recently been announced by Pantex Manufacturing Corporation. Designed for the precise control of electric circuits by means of hydraulic-pressure actuation, this Pantex Hydraulic Pressure Electric Switch will cut-in and cut-out electric circuits with as little as 12 to 18 per cent pressure differential. Unaffected by extreme pressure surges, temporary or sustained, the unit has also withstood a wide temperature differential ranging from −65°F. to +160°F. without loss of accuracy or other desirable operational characteristics. Manufactured within precision tolerances, the design of this unit eliminates failure due to either mechanical or hydraulic shock. It operates immediately with every start of the pump and requires no pressure build-up. Small, light-weight, and silent, the Pantex Hydraulic Pressure Electric Switch is quickly and easily adjusted—without breaking the line—with the added feature of preset switch limitations if desired. Complete details may be obtained by writing DIESEL PROGRESS, File 61, P. O. Box 8458, Los Angeles 46, California.

Merchandising Manager of Marley

Roy W. Maze

The promotion of Roy W. Maze to the position of merchandising sales manager of The Marley Company, Inc., has been announced by L. A. Christensen, general sales manager. A native of Kansas City, Kansas, Maze received his A.B. degree from the College of Emporia and an M.S. from Kansas State College. Following college, he spent five years teaching and in administrative work in high schools. In 1942 he joined the engineering department of the Aireon Corporation and left there two years later to join the Army. He transferred to the Navy six months later and now holds a reserve commission in the Navy. In 1946, when Maze returned to civilian life, he joined The Marley Company as public relations director, the position he held until his recent promotion. He is married and has three children and is president of the Kansas City Chapter of the National Industrial Advertisers Assn.

Appointment at Nordberg

William G. Hawkins

Mr. William G. Hawkins has been named assistant manager of the Gasoline Marine Engine Department, according to an announcement by Carl O. Friend, manager, Gasoline Marine Engine Department, Nordberg Manufacturing Company, Milwaukee 7, Wisconsin. Mr. Friend and Mr. Hawkins will be assisted by Mr. William F. Reeder, department sales and service engineer.

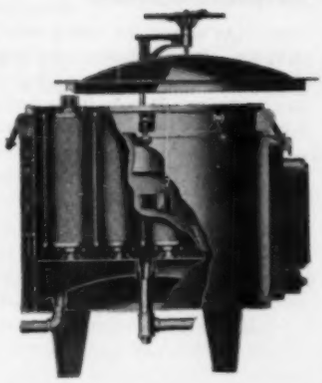
Mr. Hawkins joined Nordberg as a test engineer in the Gasoline Marine Engine Department in 1948 and was appointed sales and service engineer in 1949. Born in Winthrop, Mass., Hawkins attended school in Rhode Island. In 1931 he was placed in charge of marine equipment for Dr. William Beebe's Bermuda expedition. Later he attended Stanton Military Academy, where he was also laboratory instructor in internal combustion engines. From 1936 to 1938 he operated sports fishing boats in New Jersey and Florida, and then joined Wright Aeronautical Corporation in the research and experimental department. Before coming to Nordberg he was also associated with Fairchild Corporation, Buick Aviation, Dodge Chicago plant and Huffman-Wolfe Company, Atlanta, Georgia.

New Handy Kit

Just announced by the Heli-Coil Corporation is a series of new and compact kits for the installation of Heli-Coil screw thread inserts. Simplified kits are available and can be made up for industrial, aviation, automotive, marine and machine shop use. For maintenance, production work and field service they provide an assortment of inserts for screw threads from No. 6 to 1½-inch size in American National Coarse and Fine Series, as well as for spark plug and taper pipe thread sizes. The elaborate special kit shown was originally designed for military field use and contains a tap, an inserting tool, a tang break-off and retrieving tool, a staking tool, an extracting tool and a supply of inserts for 14 mm. spark plugs. For full information write to DIESEL PROGRESS, File 63, P. O. Box 8458, Los Angeles 46, California.

Less time for a change!

HOFFMAN Cartridge Filters



Simplify Cartridge Replacement with Exclusive Cover-Lifting Device

Along with efficient filtering at high flow rates, Hoffman Cartridge Filters provide maximum service convenience. Exclusive cover-lifting device speeds up cartridge change — either the 7 x 18 size, for Navy throw-away cartridges, or the 11 x 18, for repackable or throw-away types, offer this feature. Swing bolts fasten the cover — an additional advantage for cartridge changes.

FOR LUBRICATING, FUEL OR INDUSTRIAL OILS

Two sizes: I-718 for 7 x 18 Navy-size throw-away cartridges in multiples of 1, 2, 4, 7, 9, 14, and 18 cartridges. I-1118 series, for either repackable or throw-away cartridges, in multiples of 1, 2, 3, 4, 6, and 8 cartridges.

Write for bulletins A-703 and A-649 respectively.

Complete Recovery of Used Oil

—The HOFFMAN OIL CONDITIONER

Removes insolubles, as well as solubles, to cut new oil costs. Unit consists of Hoffman Vaporizer (to remove oil, gas, moisture and fuel dilution) . . . Cartridge Filter to remove solubles. Mounted on a common base . . . only 2 moving parts . . . no steam or water connections.

Capacities of 50 to 600 g.p.h.

Write for Bulletin A-667 and A-668

FILTRATION ENGINEERING SERVICE... For the right answer to your filtering problems, a Hoffman filtration engineer will survey your requirements and furnish recommendations based on detailed analysis of all factors. Ask for this service—There is no obligation.

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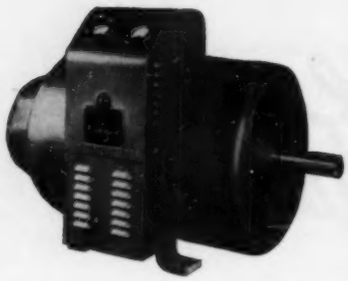
CANADIAN PLANT: CANADIAN HOFFMAN MACHINERY CO., LTD., NEWMARKET, ONT.



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When and Where You Need It!

●With E-M Packaged Generators, you can generate the same kind of steady, dependable voltage you expect from a big-city power line . . . quality voltage that keeps lights bright and machines and appliances working smoothly, evenly.

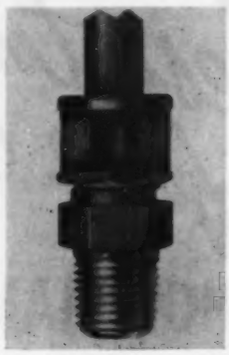
Combining meters, exciter, generator and voltage regulator in a compact unit, Packaged Generators are an original E-M development. Ratings range from 3.75 to 187 kva.

Our publication *Synchronizer 27* is packed with illustrations of on-the-job applications of this E-M packaged power. Send for a free copy.

ELECTRIC MACHINERY MFG. COMPANY
Minneapolis 13, Minnesota

E-M SPECIALISTS IN GENERATOR ENGINEERING

Leakproof Fitting



Bothersome small leaks, the bug-a-boo of instrument men, are completely eliminated by the use of Swagelok fittings made by the Crawford Fitting Company. The patented Swagelok fitting provides a vacuum tight seal. The two ferrules and the threaded chuck inside the Swagelok's nut, clinch tight around the tubing wall, providing a leakproof seal (see illustration). Laboratory tests have demonstrated that the tubing will burst before the fitting will leak. These fittings will hold heavy or thin wall tubing equally well. They are made for use with tubing material of aluminum, brass, copper, steel, stainless steel and plastic.

Swagelok fittings save time in assembly. No flaring of the tubing is necessary. They come completely assembled, finger tight. Simply insert the tubing into the nut, apply one and one-quarter turns and the job is done. Swagelok fittings are recommended to overcome problems involving pressure, vibration and torque. They are available in brass, monel, aluminum, steel and stainless steel. They are made in a range of sizes for use with tubing ⅛-inch to 1-inch outside diameter. For further information, write DIESEL PROGRESS, File 64, P. O. Box 8458, Los Angeles 46, Calif.

Catalog — Volume Fifteen

The 15th volume of the DIESEL ENGINE CATALOG is now available to the industry. A complete revision of volume fourteen, with many new engines, many new models, many old models re-rated. In this volume fifteen you will find every diesel engine, every dual-fuel engine and every natural gas engine actively manufactured and sold in these United States, technically and completely described and illustrated. Plus a large and very important accessory equipment section. Truly described as the Bible of the industry, this volume fifteen of the DIESEL ENGINE CATALOG can be obtained by mailing $10.00 to DIESEL PROGRESS, P. O. Box 8458, Los Angeles 46, California.

President of Buda Company

At a meeting of the board of directors of the Buda Company a new president was elected to succeed the late J. S. Dempsey. According to S. S. Hathaway, chairman of the company, R. K. Mangan, who for the past 12 years has been executive vice president, becomes president, while K. E. Fitzpatrick, secretary of the company, succeeds Mr. Dempsey as treasurer of Buda. Mr. Mangan came to the Buda Company in 1917 after receiving his mechanical engineering degree at the University of Illinois. He started as a mechanical engineering apprentice, but during the years held numerous positions within the company. He has travelled widely for Buda, in foreign countries and in the United States, and during World War II directed many operations when Buda expanded to more than 5,000 employes and four plants. Mr. Fitzpatrick came with Buda in 1939 as comptroller and has been secretary of the company for 10 years. The Buda Company has become one of the world's leaders in the manufacture of diesel engines, also makes materials handling and railway maintenance equipment and numerous other products along similar lines. It is 69 years old, has been established in Harvey since 1891.

SPECIAL BARGAINS

DIESEL GENERATOR SETS, 100 kw., 120/240 V., D.C., or 220/440 V., 3-phase, 60-cycle A.C., dir. con. 150 HP. SUPERIOR GBD-8 engines, elec. start with panels. Write for stock lists.

Duquesne Electric & Mfg. Co.
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Specify **ADECO**

FOR DEPENDABLE FUEL INJECTION EQUIPMENT

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YOUR STAND-BY FOR Fuel Injection Equipment and Replacement Parts for Maintenance

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PERFECT CONTROL IS ESSENTIAL!

For your automatic engine . . .

SYNCHRO-START CONTROLS are unequalled in performance, economy, safety, dependability and protection.

Eighteen years of manufacturing controls, ranging from a simple switch to multiple engine control panels, have given SYNCHRO-START the "know-how" to make a thoroughly DEPENDABLE CONTROL.

When you order your engines—SPECIFY SYNCHRO-START controls. Your manufacturer, dealer, engineering firm, or architect can furnish you with the correct control. Or write us direct.

SYNCHRO-START PRODUCTS, INC.

HILL-JOHNSON ENGINEERING COMPANY

Specializing in
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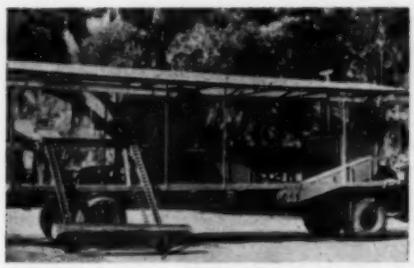
DIESEL ENGINES
COMBUSTION CHAMBERS
PUMPS — NOZZLES
and
ENGINE CONTROLS

Lake Odessa Michigan
Telephone 6271

Diesel Driven Portable Lumber Mill



A portable lumber mill, capable of cutting 10,000 feet of boards per day, recently went into operation in Polk County, Florida. This mobile sawmill, which literally follows chopping crews through the woods turning out rough cut boards at an unbelievable rate, may revolutionize lumbering in Florida, according to its designer and builder, J. W. Huff, of the Bartow Machine Works. Operated by the Townsend Lumber Company of Lake Wales, the mill is reducing logging costs by cutting down transportation and labor and eliminating expensive permanent installations. The unit consists of a 30-foot semi-trailer that is towed to its location in the woods by truck or tractor and is ready to operate in just 30 minutes. Its eighteen 24-inch circular saws quickly rip a 16-inch log into 1-inch boards 8½ feet long. Only four men are needed to keep it operating at full speed.

Mr. Huff is particularly proud of the safety factors incorporated in the mill. All gears and pulleys from the 6-cylinder G.M. diesel engine are built under the floor. Even the saws are completely shielded from workers. A powerful blower keeps the air around the mill almost completely free of sawdust. Believed to be the first mobile gang saw to cut a whole log at once, Florida lumbermen expect this new machine to have far reaching effects on the industry.

P. R. R. Places Diesel Orders of $55,000,000

NEW YORK HERALD TRIBUNE, Sept. 7th.—Pennsylvania Railroad announced recently placing of orders for 214 road freight and passenger diesel locomotives and diesel switchers totaling more than 500,000 horsepower and costing approximately $55,000,000. Walter S. Franklin, president, said financing for the locomotive purchases and for 5,000 freight cars ordered in July "has already been satisfactorily arranged" and no equipment trust certificates will be issued.

The new orders, believed to be the largest single program of its kind on record, will increase Pennsylvania's ownership of diesels to 1,034 units of 1,943,510 horsepower. Mr. Franklin said initial moves to acquire the diesels had been made before the outbreak of hostilities in Korea. The orders were the outgrowth of a thorough study of the road's present and future requirements, he said. "On the Pennsylvania there are many train operations now powered by steam locomotives," he said, "and in a number of instances the economies inherent in dieselization, compared with steam power, are not sufficient to warrant the investment in diesels. For this reason we intend to continue the use of steam power where it is economically justified," Mr. Franklin added.

Pointing to the Pennsylvania's post-war expenditures and commitments for new and reconditioned cars and locomotives, totaling $488,000,000, Mr. Franklin said the program includes $225,800,000 for 1,034 diesel electric locomotives and diesel servicing facilities; $183,850,000 for freight cars, including 21,989 new freight cars, and $75,200,000 for passenger cars, including 386 new passenger cars. The program also includes $2,940,000 for four experimental electric freight locomotives for use on the road's Eastern lines. The new diesel and new freight car program will be completed by June, 1951.

Catalog — Volume Fifteen

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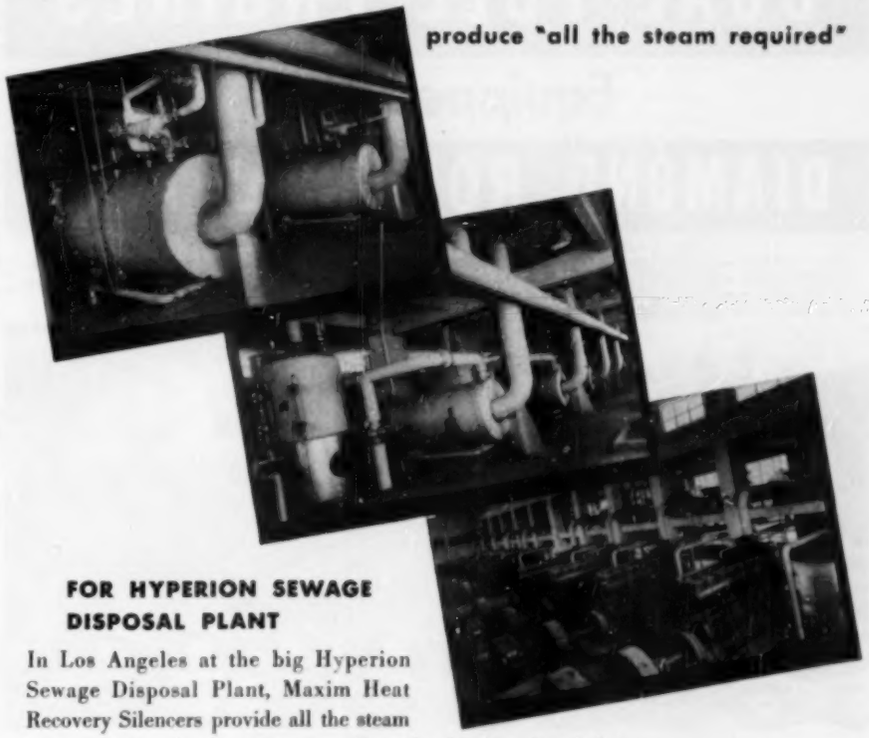
MAXIM HEAT RECOVERY SILENCERS

produce "all the steam required"



FOR HYPERION SEWAGE DISPOSAL PLANT

In Los Angeles at the big Hyperion Sewage Disposal Plant, Maxim Heat Recovery Silencers provide all the steam necessary for plant heating as well as for heating the sludge.

This outstanding installation highlights the practicality of Maxim Heat Recovery Silencers. Here is efficient use of waste exhaust heat that would otherwise just go "up the flue" to the outside atmosphere. The extra fuel cost for this usable heat is zero because the only fuel involved is that normally used for engine operation.

More and more industrial plants are combining effective silencing of engine exhaust with this efficient method of producing steam for heating or processing operations. Our Heat Recovery Silencer bulletin offered below gives details. Send for it today.

SEND FOR BULLETIN

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Please send HEAT RECOVERY SILENCER bulletin.

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COMPANY _____
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BE SURE IT'S A MAXIM

Bearing Temperature Safety Control

These multiple meter controls give remote indication of bearing temperature. They provide an automatic alarm, or machine shut down in case of over temperature. Or, corrective factors may be automatically applied. A separate meter with thermocouple is used for each bearing or other point to be monitored. Any number of bearings may be protected. The Simplytrol Contact Meter-Relays are calibrated in degrees of temperature. They show both Centigrade and Fahrenheit. The meters have contacts that close on temperature rise. (On closed circuit controls these contacts open on temperature rise.) The meter contacts operate directly into the load relays with contacts rated at 15 amps., 115 volts, or 7½ amps., 230 volts. The load relay may be used to ring an alarm, close down a machine or automatically apply a correction to overcome the cause of over temperature. The control unit consists of a metal cabinet with hinged front panel on which are mounted all components. These consist of a transformer and rectifier power supply to provide current for the relays, the load relay and any other equipment required for the installation.

The control unit may be mounted at a distance from the machine. No mechanical linkage is used between control and machine. All connections are electrical. The cabinet has knockouts for conduit on four sides. Either surface or flush panel mounting units are available. Both open circuit and closed circuit type controls are made. In the closed circuit control low limit contact meters are used. During normal operation the meter contacts remain closed. A rise in temperature opens the contacts, allowing the load relay to drop out. In the open circuit type control high limit meters are used. These are normally open circuit. A rise in temperature closes the contacts and the load relays pull in. The control illustrated has five meters for controlling the bearings on a high speed motor generator set. The sixth meter on the panel is a time counter which indicates running time in hours. These multiple meter controls may be used in many places where it is desired to measure and control the temperature at several points simultaneously. The load relays may be used separately to control individual heating or cooling elements or they may be used together to operate a common alarm.

Several furnaces or ovens may be controlled even though different temperatures are required in each. Other applications include diesel exhaust temperatures, chemical processes, plastic and rubber molding machines. Prices vary with different requirements. For an engineering estimate figure about $135.00 for the first meter and $35.00 for each additional meter in the unit. Three sizes of the Simplytrol Contact Meter-Relay are available for use in these units. They are 2⅝ inches, 3¾ inches and 4½ inches. Additional information may be had by writing DIESEL PROGRESS, File 60, P. O. Box 8458, Los Angeles 46, California.

Appointment at Enterprise

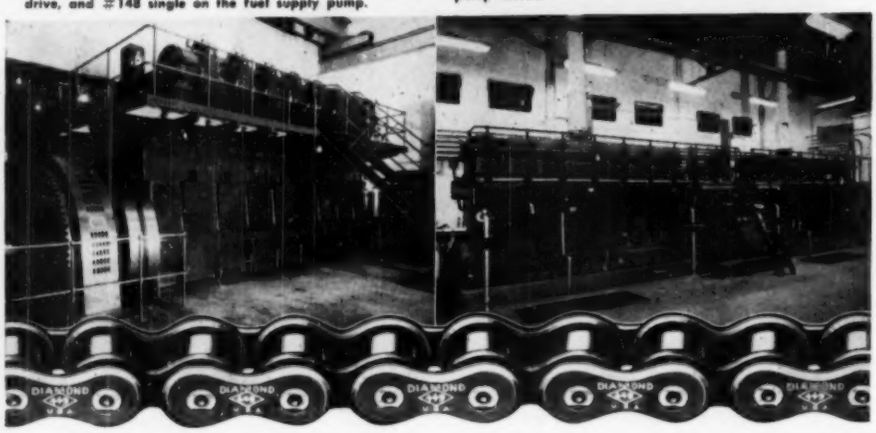
Wren Malone

Appointment of Wren Malone to the sales staff of the Chicago branch of Enterprise Engine & Machinery Co. was announced August 1 by James E. Watson, general sales manager. Malone was recently regional manager of the Superior Engine Division of the National Supply Company's Springfield, Ohio, branch. Prior to his position with that company, he served four years in U. S. Army Intelligence. He will serve Enterprise in the Illinois, Ohio, Indiana, Michigan and Wisconsin area, where he has become a familiar figure in diesel engine circles during the past five years.

DUAL FUEL ENGINES
Equipped With
DIAMOND ROLLER CHAINS

Fulton dual-fuel engine with Diamond #472 triple Chain on both primary and secondary timing drives, #148 triple for the water pump, #148 double on the lube oil pump drive, and #148 single on the fuel supply pump.

Two Cooper-Bessemer 2-cycle 1000 h.p. engines driving 1500 KW generator. Diamond Chain camshaft and fuel pump drives.



● Due to the greatly reduced operating costs, Dual-Fuel engines have been installed in greatly increased numbers during the past few years.

On many well-known 4-cycle dual-fuel engines, Diamond Roller Chains are used for such drives as camshaft primary and secondary timing, fuel oil pumps, lube and water pumps.

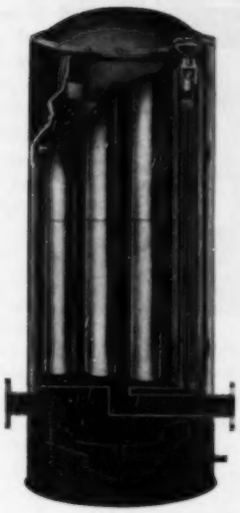
On 2-cycle engines as regular and replacement applications, they provide ideal long center drives for the positive operation of the valves needed to take care of gas intake without waste exhausting with the scavenging air.

A quarter century of service on engines has given ample proof of the long-life efficiency, uniform quality and dependability of Diamond Roller Chains. Discriminating engineers invariably make them first choice.

DIAMOND CHAIN COMPANY, Inc., Dept. 407, 402 Kentucky Avenue, Indianapolis 7, Indiana. *Offices & Distributors in All Principal Cities.*

DIAMOND ROLLER CHAINS

HONAN-CRANE Oil Purification offers



3 types of interchangeable CARTRIDGE REFILLS

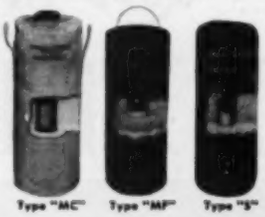
for correct handling of every purification problem

Three types of cartridge refills, designed by Honan-Crane especially for Honan-Crane purifiers, make it possible for you to select the filtering medium best suited to your purification needs. Cartridges are interchangeable and may be used to remove either solids or products of oxidation . . . maintaining any oil in approximately new condition.

Easy-to-handle Honan-Crane refill cartridges are your assurance of thorough oil purification at lowest cost.

Honan-Crane Type "M" Continuous Oil Purifier

Multiple-cartridge purifier, available in eleven sizes using 1 to 24 cartridges. Provides high flow rate and is designed to use easy-to-change "MC", "MF", or "S" type cartridges.



Type "MC" Type "MF" Type "S"

Honan-Crane Type "MC" Cartridge

"MC" Cartridge is a woven cotton bag containing 15 pounds of Cranite (specially processed fullers earth). Solids and abrasives as well as soluble products of oxidation such as asphaltenes, resins and acids are removed from the oil.

Honan-Crane Type "MF" Cartridge

"MF" Cartridge is a perforated metal basket lined with a woven cotton sack material and uniformly packed with Palconia (specially selected cellulose fiber filtering medium). Complete removal of solids such as abrasives, scale and other foreign matter.

Honan-Crane Type "S" Cartridge

Type "S" Cartridge contains 4½ pounds of Palconia tightly packed in a specially woven cotton sack material. Performance of the cartridge is comparable to the "MF" cartridge in removal of abrasives, scale and other foreign solids.

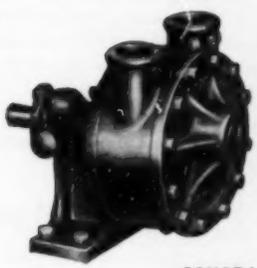
Write for descriptive bulletins covering Honan-Crane Oil Purification Equipment for Diesel Lube and Fuel Oils, Turbine Oils, Cutting Oils, Quench Oils, Coolants, etc. State type of purification problem.

HONAN-CRANE CORPORATION

[illegible] INDIANAPOLIS AVE. LEBANON, INDIANA

A Subsidiary of HOUDAILLE-HERSHEY CORP.

designed for carefree performance...



That's why it pays to specify TUTHILL

GENERAL PURPOSE PUMPS

• Low first cost • Negligible maintenance • Compact design • Operates dependably in either direction of rotation • Capacities to 200 g.p.m. • Pressures to 100 p.s.i. • Direct drive, slow-speed V-belt units and stripped models

Write for Model C bulletin.

TUTHILL PUMP COMPANY

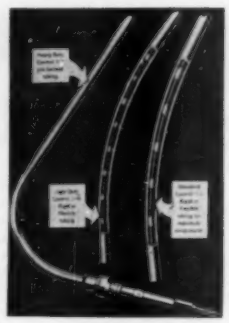
939 East 95th Street - Chicago 19, Illinois - Phone RE 4-7420

Electrifugal Pump

A redesigned close-coupled Electrifugal pump and motor with internal and external design changes to provide improved operating characteristics and greater ease in maintenance has been announced by Allis-Chalmers Manufacturing Company. The improved unit has new sealed motor bearings; a unit-cast frame which provides perfect and permanent alignment; double seal on front motor bearing which keeps liquid out of the bearing under normal operating conditions, and a large opening in the frame between the pump and motor to make packing maintenance quick and easy. Its all cast iron construction resists corrosive atmospheres.

The pump is available with removable casing in some sizes and with removable cover plate in others. It can be had in ratings from 10 to 500 gallons per minute at heads to 220 feet. The motor is designed and built especially for the Electrifugal pump. It has a double-dipped and double-baked stator, a rotorof pressure die-cast aluminum construction, and ventilating fans which move the air from the rear of the motor to the pump end. Motors range in size from ¾ to 10 horsepower. They are available in drip-proof, splash-proof, totally-enclosed fan-cooled or explosion-proof types.

Push-Pull Control Provides Flexible Industrial Application



A line of pre-assmbled and pre-formed push-pull controls, designed for economic and efficient transmission of motion, is being manufactured by the Industrial Division of Simmonds Aerocessories, Inc. These are improved models of the push-pull controls which have had over a million successful war-time installations. Basic elements of the Simmonds push-pull control are a moving member, or linkage, enclosed in either a rigid or flexible casing, or a combination of both. Two types of linkage are available, a No. 4 (¼-inch O.D.) light duty control for light aircraft and industrial application, and a No. 5 (5/16-inch O.D.) and a No. 7 (7/16-inch O.D.) for combined accuracy and strength.

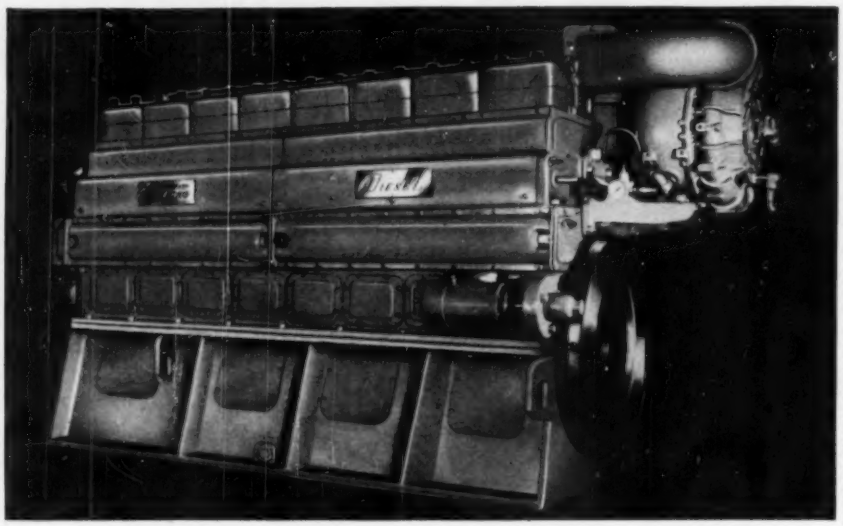
Time and money-saving applications in marine, railroad, automotive and industrial fields are made possible by the wide variety of fittings and attachments available with these controls. In many instances they have been designed into machinery to transmit cycling motion. Standard end fittings available are sliding rods (threaded, plain and hooked ends); clevis ends; quick detach coupling units; ball and socket end fittings; radian units (converting linear to rotary motion); friction locks (for locking control in any position of its stroke); adjustable friction heads (for varying control resistance to movement) and a vernier head for combining adjustable friction head and friction lock functions and providing vernier adjustment. Complete information may be had by writing DIESEL PROGRESS, File 58, P. O. Box 8458, Los Angeles 46, California.

New Book on Link-Belt Worm Gear Drives

Link-Belt worm gear drives of three basic types, each available in 10 different sizes, for fractional or large horsepower, and in speed ratios of 3⅛ to 1 up to 8,000 to 1, are illustrated, described, tabulated in a new 80-page book No. 2324, released by Link-Belt Company. Features enumerated for these enclosed right-angle drives are: Compact design; anti-friction bearings; automatic splash lubrication; high ratios in small space; operation at high input speeds; quiet performance; and their availability for vertical or horizontal driving. Pages 10 through 15 contain typical drive problems with their solutions and show the ease with which the proper drive may be selected for a specific duty. A copy of new Link-Belt Book No. 2324 will be forwarded to any interested reader upon request.

DIESEL ENGINE CATALOG is just off the press in its Fifteenth Edition. Completely revised and up-to-date, it is invaluable to design engineers and buyers. ORDER COUPON ON PAGE 66.

More POWER... Less SPACE
WITH
STERLING VIKING DIESELS



This 8-cylinder turbo-supercharged Viking Diesel is conservatively rated at 750 hp. Sterling Diesels are available in five different models beginning at 100 hp.

DIESEL POWER
for all
INDUSTRY

AUTOMATIC POWER PLANTS
DRILLING RIGS — HOISTS
LOCOMOTIVES — PIPE LINES
GENERATOR SETS
FISHING CRAFT — DREDGES
LIFT BRIDGES — TOW BOATS
COMPRESSORS — AIRPORTS
VENTILATING SYSTEMS
PUMPING STATIONS
SHOVELS

Sterling Viking Diesel engines offer definite advantages in:

Compactness . . . more power in less space. A high ratio of horsepower to weight.

Sturdy construction . . . one piece block and base. All working parts are easily accessible.

Dependability . . . Service records show a high operating efficiency, low maintenance cost. All Sterling Diesels are conservatively rated, built to deliver smooth performance over their full power range.

Without cost or obligation, talk over your power requirements with an **experienced** Sterling engineer. We invite your call and the opportunity to bring you up to date on Sterling's accomplishments.

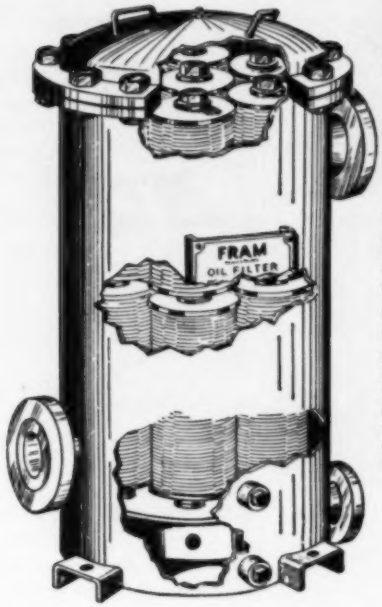
STERLING ENGINE COMPANY

1270 Niagara St. Telephone Lincoln 0382 Buffalo 13, N. Y.

Sterling Viking Diesel Engines from 100 to 750 hp.—Sterling Gasoline & Gas Engines from 100 to 600 hp.

FRAM FILTERS Cut Costs...

Extend Overhaul Periods



Read this 3 year performance record . . .

AT Springfield Bronze and Aluminum Co., Springfield, Mass., overhauls used to be required every 8000 hours on their 100 h.p. Diesel generator. Today, under the same grueling 24-hour running conditions, Fram Filters have extended overhauls to 20,000 hours.

GOOD CONDITION

Previous overhauls showed piston rings in poor condition, all at least partially frozen. Lube oil was black, dirty, laden with contaminants. Since installing Fram, the last overhaul was made after 833 days of continuous operation. The general condition of the engine was very good with "blow-by" at a minimum.

CUTS LUBE COSTS

The company calculated that the average cost of keeping lube oil clean to a .01 naphtha insolubles standard is 2 cents per hour, with oil change periods of 1000 hours compared to oil changes every 200 hours as previously required.

WRITE TODAY . . . Let Fram's Research Department help you determine how Fram Filcron Filters can give you lower operating costs and increased efficiency. You're sure of top performance because Fram Filters are *unconditionally guaranteed*. Write the Fram Corporation, Providence 16, R. I. *In Canada:* J. C. Adams Co., Ltd., Toronto, Ontario.

FRAM *Filcron*

THE MODERN OIL FILTER

ATLANTIC METAL HOSE GUARDS DIESEL LIFELINES

air
fuel
water
exhaust

Typical Double Insulated Exhaust Hose

Write for Diesel Bulletins 1020 and 50A.

•

See our Catalog in Sweet's File for Product Designers.

ATLANTIC flexible metal hose does a **better** job of controlling vibration of these vital lines and insuring their continuous, trouble free operation—because each section is **Job Tested and Guaranteed to Do Its Job!**

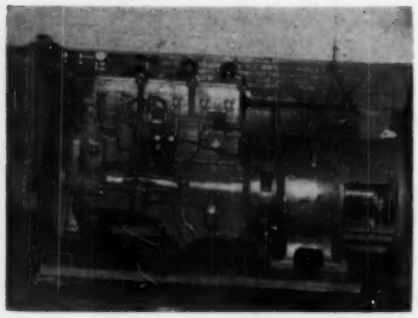
That's why more and more purchase requisitions read, "Order from Atlantic for **Every** Diesel Need!" Furnished in all workable metals—⅛"-36" I.D. inclusive . . . with fittings as desired.

ATLANTIC METAL HOSE CO., INC.

102 West 64th St. New York 23, N. Y.

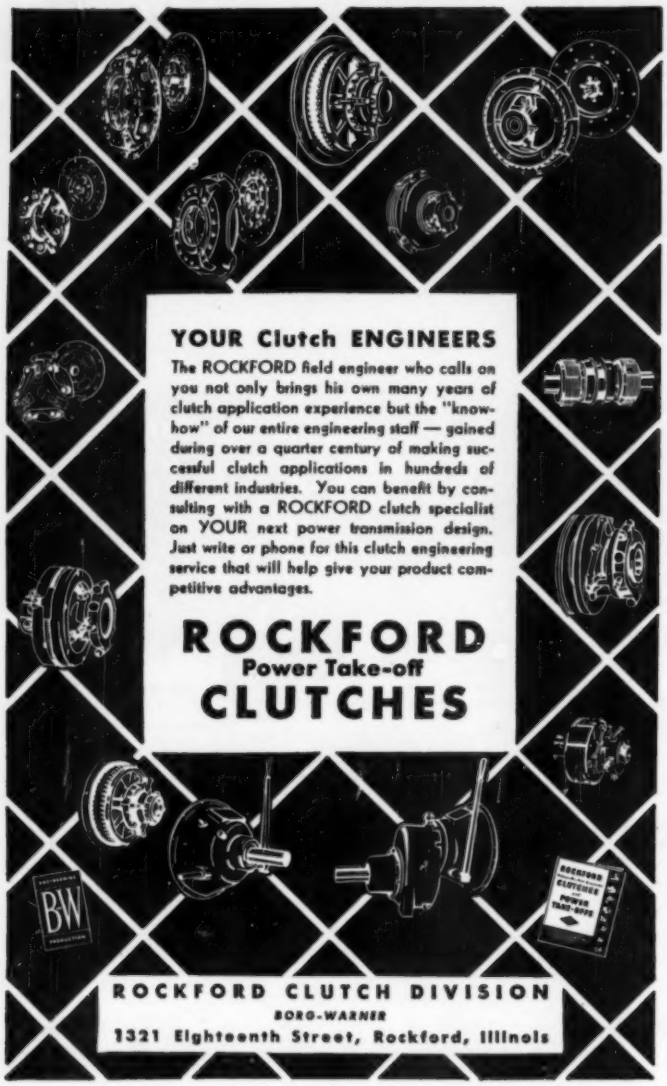
NEW
Sheppard
DIESEL
INDUSTRIAL
TRACTORS
Sheppard Diesels, with their rugged, heavy-duty construction, are ideal for use with a hydraulic front end loader.
Four models
. . . 7 power sizes
Wherever quantities of material are moved by loader, blade or trailer, a Sheppard Diesel's 75% fuel cost savings can mean the difference between profit or loss on the operation. A Sheppard Diesel's extra lugging power is especially desirable when heavy loads must be moved up steep inclines or over soft, heavy footing. Arc welders, compressors, pumps and other similar equipment can be built integral with a Sheppard to provide a compact, self-propelled unit.
Cut Fuel Costs
ON MATERIAL HANDLING
Over 75%
Mail today for full information
SHEPPARD DIESELS • HANOVER, PA.
I am interested in a Sheppard Diesel Tractor for
Name
Address
DEALERS: Write for complete details on the profitable Sheppard Diesel Franchise plan.
DIESEL'S THE POWER . . . SHEPPARD'S THE DIESEL

Generating Diesel Unit

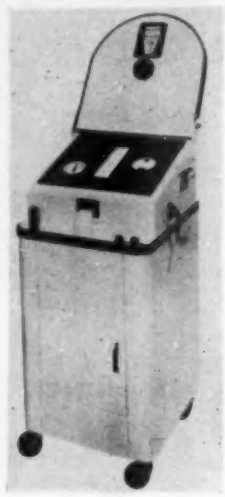


A standard Cummins diesel unit drives a specially designed generator for lighting and air conditioning the Burlington Railroad's new commuter trains in Chicago. The installation was made after a job analysis by Cummins Diesel Sales Corporation, the Chicago dealership of Cummins Engine Company, Inc. The standard equipment is a 165-hp. model HRIP-600 Cummins Diesel. The special equipment is a 71-volt, 65-kilowatt Century Electric Company generator.

The job consisted of taking the Cummins diesel, having the generator built to specifications, and then of designing the channel iron mounting that carries 6,341 pounds of weight cushioned by oil-resistant rubber. A distribution board was designed and adapted by the railroad to the confining needs of rail car dimensions, and a standard muffler was used to quiet the engine. The whole unit was mounted directly over the forward truck of the car. A total of 14 of these units has been ordered by the Burlington as part of its program of improving suburban commuter service by air conditioning, more comfort, and better lighting. There are 15 other Cummins diesel generator units in use on the Burlington. The HRIP-600 engine used in the commuter train installation is a standard industrial model manufactured by Cummins as part of its widely-varied line for applications in rail, trucking, industrial, construction, marine and other equipment in the 50-550 hp. range.


YOUR Clutch ENGINEERS
The ROCKFORD field engineer who calls on you not only brings his own many years of clutch application experience but the "know-how" of our entire engineering staff — gained during over a quarter century of making successful clutch applications in hundreds of different industries. You can benefit by consulting with a ROCKFORD clutch specialist on YOUR next power transmission design. Just write or phone for this clutch engineering service that will help give your product competitive advantages.
ROCKFORD
Power Take-off
CLUTCHES
ROCKFORD CLUTCH DIVISION
BORG-WARNER
1321 Eighteenth Street, Rockford, Illinois

New Motor Analyzer



Western engineers, whose research on precision testing equipment has produced everything from geiger counters to radar aircraft scopes, recently climaxed a two-year development program with announcement of a new motor analyzer that registers all engine troubles in written form. The engineering principles represented by the new analyzer are variations in engine vacuum echo specific mechanical conditions within the power plant. Worn piston rings, weak or broken valve springs, pitted, warped or sticking valves, improper timing, poor carburetion, leaky gaskets, defective fuel pump, loose timing gear chain, restricted exhaust, burned heat riser, weak coil and bad plugs, each produce a distinctive vacuum response.

Marketed nationally under the trade name "Auto-Graph," the new motor analyzer is self-contained and operates independently of outside power. The complete machine consists of a cabinet base, an upper cabinet housing the working mechanism, and a top cabinet for master graphs printed on a metal wheel which rotates to expose each pattern behind a windowed opening. Each cabinet is separate from the other to facilitate bench or field use on cars, boats, agricultural or construction machinery. With a total weight of only 85 pounds, handling is no problem. Despite the new instrument's unusual features, the design is extremely simple and free of complications. It sells for about $400 at the factory. Complete illustrated information is available from Diesel Progress, File 55, P. O. Box 8458, Los Angeles 46, Calif.

Catalog — Volume Fifteen

The 15th volume of the Diesel Engine Catalog is now available to the industry. A complete revision of volume fourteen, with many new engines, many new models, many old models re-rated. In this volume fifteen you will find every diesel engine, every dual-fuel engine and every natural gas engine actively manufactured and sold in these United States, technically and completely described and illustrated. Plus a large and very important accessory equipment section. Truly described as the Bible of the industry, this volume fifteen of the Diesel Engine Catalog can be obtained by mailing $10.00 to Diesel Progress, P. O. Box 8458, Los Angeles 46, California.

MORE POWER

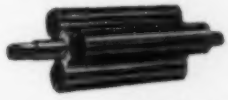
B-W supercharging means less engine space requirement and decreased weight for a given horsepower . . . it means *plus* power to pull heavy loads up steep grades . . . it means sea level power at high altitudes . . . it means MORE usable brake horsepower! And it means all these things without corresponding increases in operating costs.

The engine manufacturer who wants to provide extra power at a lower cost for original equipment . . . or who wants to add an entire new series of models to his line without retooling, or the expense of redesign, can do so simply by equipping his present line with B-W Superchargers.

A preliminary discussion will involve no obligation. Write today for additional information.

B-W SUPERCHARGER FEATURES

HIGHER EFFICIENCY through reduced rotor end clearance by means of this seal. A B-W SUPERCHARGER PATENTED FEATURE.



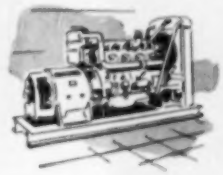
HIGHER EFFICIENCY by reduced tip clearance with this tip insert.

engineering Pesco production

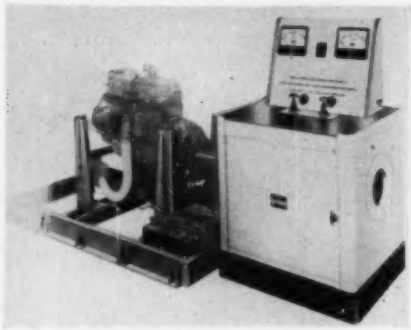
PRODUCTS DIVISION

BORG-WARNER CORPORATION

24700 NORTH MILES ROAD BEDFORD, OHIO



Clayton Introduces Engine Dynamometer



A line of compact and low cost engine dynamometers designed for engine run-in in service shops and end of production line testing has been placed on the market by the Clayton Manufacturing Company. These models, included in the company's production of engine and chassis dynamometers, will operate with horsepower ratings from 50 to 2,000 at many different speeds. Each unit will handle an extremely wide range of speeds and powers, thereby making possible the testing and "running in" of a variety of engines on the same machine.

This flexibility makes dynamometer operation practical in many shops where it was formerly uneconomical. The machines can be adapted readily to the needs of gasoline and diesel engine manufacturers, engine rebuilders, automotive fleet shops, aircraft and marine engine shops and electric motor manufacturers. Positive as well as flexible control of the torque load set for the engine to be "run in" or tested is guaranteed. The load can be varied instantly at will, or maintained indefinitely without the slightest change. Loads may be increased or decreased and then reestablished without sacrificing accuracy in any degree. Standard equipment includes direct reading electric speed and horsepower meters. The Clayton Dynamometer also is readily adaptable to the finest of laboratory instruments. For further information write DIESEL PROGRESS, File 54, P. O. Box 8458, Los Angeles 46, California.

No ONE Accessory Pays DIVIDENDS So Regularly as a GOOD OIL FILTER

Important Diesel engine builders and big scale users of engines reduce oil consumption, cost, and maintenance through use of MICHIANA Filters

Pair of 17400 Filters on common base casting. Each 50 H.P. capacity —combined, 100 H.P.

Lubrication is improved, fewer oil changes required, engine parts kept clean and bearing wear reduced. All this adds up to better engine performance, greater overall efficiency, fewer overhaul jobs, and dollar-and-cents economy.

MICHIANA Filters are made in a wide range of capacities — to meet small and large engine requirements. Bulletin 45-D mailed on request.

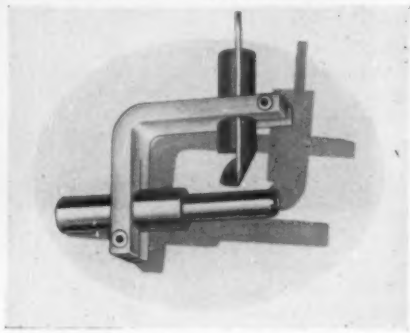
MICHIANA PRODUCTS CORPORATION, Michigan City, Indiana.

Above: 163 H.P. Filter Model 17050 in which one standard Element is used.

Left: 653 H.P. Filter Model 19800 using four standard Elements. Other sizes of Filters up to 3266 H.P. using same Elements.

MICHIANA OIL FILTERS For Diesel Engines

New Hose Cover Stripping Tool



Aeroquip Corporation, manufacturers of flexible hose lines with detachable fittings, has now available a hose cover stripping tool for removing the outer cover from Aeroquip double and single wire braid hose as is necessary prior to attaching the fittings. While the outer cover may be removed by hand, the hose cover stripping tool, No. F-1785, will greatly speed up this operation and allow users to take even greater advantage of the many features of Aeroquip hose lines. The stripping tool is an inexpensive product which may be used with equal efficiency by placing it in a standard shop vise, lathe chuck, drill press or in the revolving chuck of the Aeroquip hose line assembly machine. Compact and manufactured of quality materials, each part of the tool is individually replaceable. Each mandrel is designed to insure the user automatically removing only the amount of cover necessary for assembling the corresponding hose fitting. Additional information on the stripping tool may be obtained by writing DIESEL PROGRESS, File 57, P. O. Box 8458, Los Angeles 46, California.

Utility Buys Dupont Building Plant

Another fine, money making diesel plant has fallen into the hands of the Phillistines. Away back in the March, 1939, issue of DIESEL PROGRESS we described the installation of three 700-kw. General Motor diesels in the Dupont Building, Miami. From that date on this power plant has supplied all the power and light requirements of this big office building, which used enough power to equal the demands of a city of 1,500 people. Now comes the news that the Florida Power and Light Co. has bought the power plant, is dismantling it and will supply the Dupont Building with high line power. An efficient diesel power plant is a tough measuring stick for a high-rate-charging utility to buck.

Announcing a New Piston Ring Material

"CYCLAN"

Especially developed for severe service in high duty diesel and gas engines. This superior material has the following necessary qualifications of a good piston ring alloy!

- ✓ *En Value* higher than 20,000,000.
- ✓ *Tensile Strength* in excess of 60,000 P. S. I.
- ✓ *Extreme Resistance* to Property Changes under operating conditions.
- ✓ *High Impact Value* for shock resistance.
- ✓ *High Resistance to Breakage* and the ability to undergo considerable distortion prior to fracture without sacrificing resilience.
- ✓ A Structure that assures excellent wear qualities.

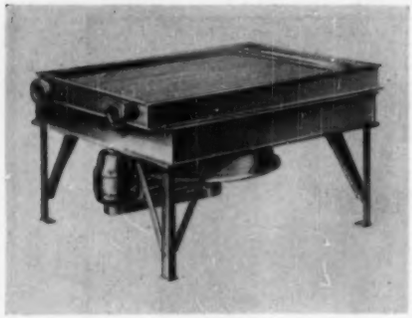
Write for additional information.

SEALED POWER CORPORATION
MUSKEGON, MICHIGAN

Sealed Power

PISTON RINGS · PISTONS
CYLINDER SLEEVES

New Models by Marley



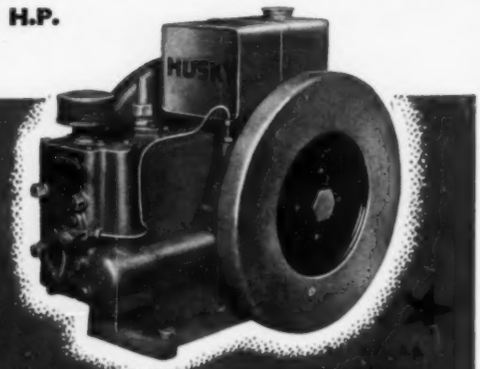
Three new DriCooler models have been added to the line of dry cooling equipment manufactured by The Marley Company, Inc. Two of the models are small "portable" units, while the other model is designed to fill the need for a medium size unit. Although designed primarily for cooling engine jacket water, they can also be used for cooling natural gas, lube oils, chemical solutions, fluids of refining stages, ammonia or steam condensing, etc. Models L and M, the portable units, are both forced draft, and have the same cooling capacity. Model L, however, has the fan and tube sections mounted vertically, while Model M (illustrated) has them mounted horizontally. There are seven different sizes of each model. Model JJ units are larger in capacity, and are also forced draft, with horizontally mounted sections.

Standard sections on these units are made of round copper tubes with pressure-bonded aluminum or copper fins, brazed into formed steel pipe headers. They are designed to operate up to 150 psi at 300°F. Framework is made of heavy angle columns braced with angle members. Casing is heavy gauge steel, stiffened with structural angles. Units are completely fabricated and are piece-marked for easy assembly. A corrosion-retarding paint is shop applied. Marley cast aluminum alloy fans are used with a V-belt drive. Fan shafts move on grease-packed bearings in an enclosed bearing housing. Write for additional data to File 65, DIESEL PROGRESS, P. O. Box 8458, Los Angeles 46.

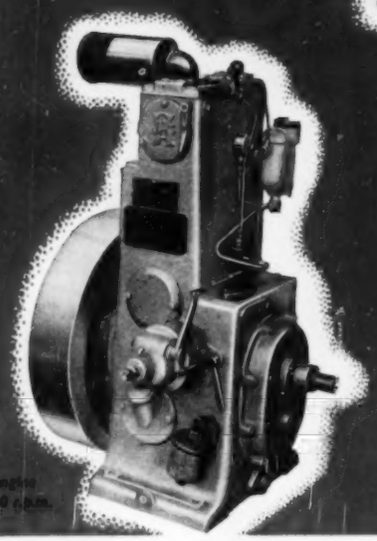
RN
RUSSELL NEWBERY

DIESEL & DUAL-FUEL ENGINES

5 to 150 H.P.



Robustly designed for continuous service and ease of maintenance and backed by forty years' experience.



INDUSTRIAL
9 models 1–6 cylinders, 5/150 h.p. at 600/1000 r.p.m.
4 models 1–4 cylinders, 13/52 h.p. at 1500 r.p.m. (B.E.S.A. ratings.)
60-cycle A.C. or D.C. Generator Sets up to 95KW.

MARINE PROPULSION
8 models 2–6 cylinders, 18/150 h.p. at 1000 r.p.m.
4 models 2–4 cylinders, 22–48 h.p. at 1200 r.p.m.
3 models 2–4 cylinders, 27/52 h.p. at 1500 r.p.m. (B.E.S.A. ratings.)

MARINE AUXILIARY
Generator, Pump and Compressor Sets for Shipboard use—range as Industrial.

APPLICATIONS INVITED from firms in the U.S.A. interested in the possible distribution of our range of diesel engines. Stock and Credit Facilities available.

RUSSELL NEWBERY & CO., LTD.
ESSEX WORKS, DAGENHAM, ESSEX, ENGLAND. Cables: Diesel, Dagenham

Distributors
CANADA—CANADIAN FAIRBANKS-MORSE CO., MONTREAL AND BRANCHES
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COLOMBIA—IGNACIO GOMEZ Y CIA. BOGOTA

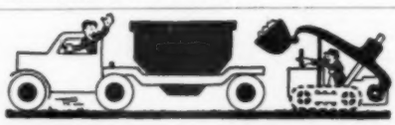
Educational Director of DEMA

Robert L. Stanley

Robert L. Stanley will join the staff of the Diesel Engine Manufacturers Association on October 1 as educational director. Professor Stanley comes to this position from The Pennsylvania State College, where he has been working in diesel engine research in the engineering experiment station. Both Professor Stanley and the diesel activities of The Pennsylvania State College are well known throughout mechanical engineering circles, which means he will be welcomed by educators in the diesel engineering field. DEMA's educational program is pointed toward helping those professors do a better job who are teaching diesel engine courses in the 120 accredited mechanical engineering schools of the country. Prior to Professor Stanley joining the teaching staff at The Pennsylvania State College, he was at Union College, Schenectady, New York. He is a graduate of both Ohio State and Rutgers Universities. Among the projects for which Professor Stanley will be responsible are a series of one-day regional meetings for professors teaching courses in diesel engineering. The meetings already scheduled this fall are as follows:

October 12—Sinclair Refining Company Laboratories, Harvey, Illinois. October 17—Erie Forge Company, Erie, Pa. October 20—Esso Laboratories, Linden, New Jersey. October 21—Massachusetts Institute of Technology, Cambridge, Mass. November 11—University of Washington, Seattle, Wash. November 13—Shell Oil Company Research Laboratories, Emeryville, Calif. November 29—The Cooper-Bessemer Corporation, Grove City, Pa. November 30—The Baldwin Locomotive Works, Eddystone, Pa.

DIESEL ENGINE CATALOG is just off the press in its Fifteenth Edition. Completely revised and up-to-date, it is invaluable to design engineers and buyers. ORDER COUPON ON PAGE 66.



ABOE Buys Canadian Diesel Engine Producer

The Brush Electrical Engineering Company, Loughborough, England, parent company of ABOE, Inc., New York, has acquired a controlling interest in the Vivian Diesel Works Ltd., of Vancouver, British Columbia, it was announced recently by Ronimund Bissing, president of the American company. Value of the transaction, he reported, is on the order of 500,000 Canadian dollars.

Result of the deal, Mr. Bissing said, will be to assure continuity of supply of ABOE engines to the North American market under all circumstances. Drawings and specifications of all engines in the ABOE group are immediately being placed with the Canadian company, which will continue the manufacture of Vivian engines while setting up production of the British line. The Vivian business was established some 40 years ago and has been built up by W. Vivian into a leading factor in the Canadian diesel field. He is retaining a minority interest in the company and remaining on its board of directors.

New Towboat for Socony-Vacuum

Construction will be started soon on the largest and most powerful towboat in the inland fleet of the Socony-Vacuum Oil Company, Inc. Socony-Vacuum announced recently that a contract for construction of the towboat has been awarded to the St. Louis Shipbuilding & Steel Company, St. Louis, Mo., and that the vessel is scheduled for completion in March. It will operate principally on the Mississippi, Ohio and Ilinois rivers.

Powered by twin screws and two 1,600-horsepower diesel engines, the new towboat will be 156 feet long, with a beam of 35 feet and a moulded depth of 11 feet. Its draft will be eight feet. Socony-Vacuum executives said the increase in power over the present towboats will enable the new vessel to move a normal load of eight barges with far more speed and economy than heretofore. Each barge has a capacity of 10,000 barrels of crude oil or of petroleum products, equivalent to 420,000 gallons.

Texas-Illinois Natural Gas Pipeline Orders 25 Worthington Compressors

Twenty-five Uniflow Angle Gas Engine Compressors have been ordered from Worthington Pump and Machinery Corporation by the Texas-Illinois Natural Gas Pipeline Company, which recently dedicated its pipeline at ground breaking ceremonies near Hungerford, Texas. This pipeline will run from Southwestern Texas to Joliet, Illinois. In these engines, the through-scavenging system has been adapted to pipeline gas engines for the first time. The superiority of this system has been thoroughly proved by its long use in diesel engines and its adaptability to gas engines by seven years of research by Worthington. These engines thus represent a distinct advance in pipeline compressing equipment.

On the original gas pipeline to Chicago, built by Natural Gas Pipeline Company of America in 1931 from the Texas Panhandle field to Joliet, Illinois, Worthington furnished fifty-seven 1,400-horsepower gas engine compressors—the total on the pipeline. When the completion of a duplicate parallel line was started in 1946 thirty-seven gas engine compressors of this same type, size and horsepower were furnished and a total of 104 of these twin tandem horizontal Worthington units are now operating on these two lines. This recent purchase through an affiliated company makes the third time Worthington has supplied the major requirements for these associated lines. These twenty-five angle type gas engine compressors of 2,000-hp. and 10 cylinders each will be the total number of the initial installation on the pipeline of the Texas-Illinois Natural Gas Pipeline Company, an affiliate of Natural Gas Pipeline Company of America.

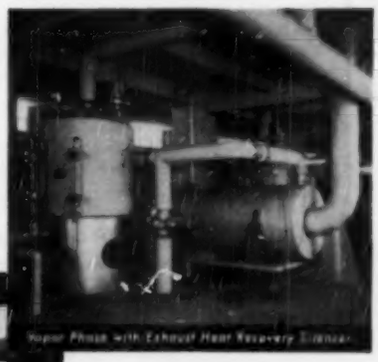
Assistant Plant Manager at Weston

Earl R. Mellen, president of the Weston Electrical Instrument Corporation, Newark, N. J., has announced the appointment of James J. Hagan as assistant plant manager. Mr. Hagan joined the Weston organization in 1942 as a time study engineer and three years later was made personnel director. He lives at 59 Elmwood Terrace, West Caldwell, N. J., and is a member of the Industrial Relations Research Association.

FREE POWER & HEAT *On Fuel Generated from Sewage*

In the World's Largest, Most Modern HYPERION SEWAGE TREATMENT PLANT —*City of Los Angeles*

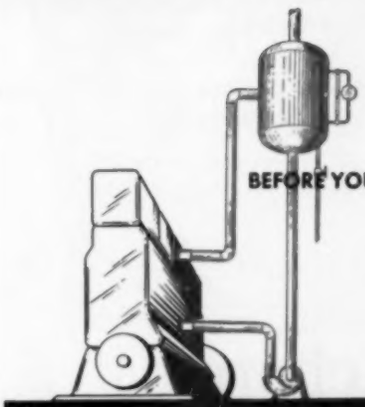
15,000 HORSEPOWER AVAILABLE, AND OTHER VITAL ECONOMIES, FOR THE COST OF ENGINE PILOT FUEL *ONLY!*



Vapor Phase with Exhaust Heat Recovery Silencer

View of Hyperion Engine Room with Vapor Phase Installation on balcony

Made possible by ULTRA MODERN VAPOR PHASE



NINE VAPOR PHASE UNITS, in this modern plant, permit the use of ordinarily harmful sewage gas fuel in the nine huge dual-fuel engines, to produce 15,000 HP for plant operation. Also, **VAPOR PHASE** utilizes the engine heat, usually wasted, to supply *all heat* for sludge, plant heating and other requirements—eliminating the need for expensive boilers, heaters and heat exchangers. *All this* for the small cost of engine pilot fuel *only!*

BEFORE YOU BUY AN ENGINE, *GET THE VAPOR PHASE STORY*

Regardless of engine size, nature of business or requirements, Vapor Phase converts old or new engines into long-life, super-efficient power units, without increasing fuel cost.

Vapor Phase equipped engines *also* serve the multi-purpose job of generating steam, heating water, fluids, space or other process (including cooling or heating through air conditioning systems)—each as required or all at the same time, for the cost of engine operation *only*. Imagine the saving!

VAPOR PHASE pays off in Savings alone, the first year. The unit costs nothing to operate and is good for life.

Write or Wire for Information Applying to Your Specific Needs

Offices in Most Principal Cities

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DIESELS for operating ECONOMY

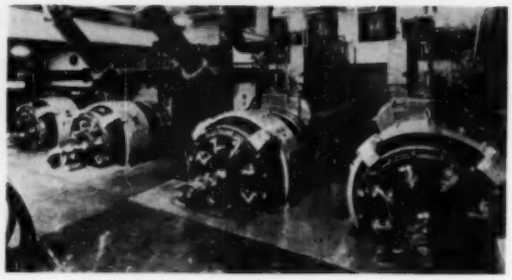
The present day trend toward diesels — both for new installations and for replacements — is largely due to operating economy and dependability.

Current installation practice is to mount them on Korfund Vibro-Isolators.

This makes it possible to install diesels *anywhere* with positive assurance that there will be absolutely no transmission of objectionable vibration. Additional benefits include savings from reduction of building and engine maintenance costs, and frequently the elimination of concrete foundations.

Vibration is absorbed by steel springs which provide the finest isolating medium available. Thrusts are controlled by resilient chocks in the four corners.

The result is smoothed, floating operation at all speeds — in marine, mobile, or stationary installations. The cost is low. Ask for Bulletin G-102. Representatives in principal cities.



FOUR OF FIVE DIESEL GENERATORS—TWO PARK AVE. OFFICE BLDG., N.Y.C.
Four Worthington 6-cylinder, 450-H.P. diesel generators on two foundations supported by 24 Korfund Vibro-Isolators. An additional 750-H.P. Supercharged Worthington unit installed at later date on Korfund-isolated foundation. Note flexible pipe connections and floor plates over isolators. Korfund Vibration Control permitted economical diesel power generation without vibration transmission in this busy office building.

A FEW TYPICAL INSTALLATIONS

City of Seattle Fire Boat *Duwamish* . . . Three 950-hp. Cooper Bessemer.
Chicago & North Western Railway System . . . Three 275-hp. Sterling.
Bangor Hydro-Electric Co., Bangor, Maine . . . Six 1425-hp. Nordberg.
Floyd Bennett Field, New York . . . One 450-hp. Fairbanks-Morse.
Lenox Hill Hospital, New York . . . One 750-hp. Worthington.
Lone Star Gas Co., Dallas, Texas . . . One 400-hp. Cooper-Bessemer (Gas).
Sun Oil Co., Marcus Hook, Pa. . . . Four 250-hp. Ingersoll-Rand (Gas).
City of Oklahoma, Oklahoma City, Okla. . . . Seven 210-hp. and three 175-hp. Worthington (Gas).
Namm Department Store, Brooklyn . . . Four 300-hp.; One 180-hp.; One 150-hp. Worthington.
Cia Central Argentina De Electricidad, Buenos Aires, S.A. . . . One 270-hp. Sulzer;; Three 540-hp.; One 700-hp. Deutz.

The Korfund Company, Inc.
48-20B 32nd Place, Long Island City 1, N. Y.

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See us in Booth No. 110 at the Plant Maintenance Show, Cleveland, January 15-19

Pritchard's NEW Quintair*

AIR COOLED HEAT EXCHANGER

For Low Cost, Dependable Cooling of Engine Jacket Water and Lubricating Oil

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New Valve Seat Insert

A new valve seat insert is announced by Martin Wells of Los Angeles to meet all size specifications for internal combustion engines. The manufacturer states that the alloy used in manufacturing this valve seat has been so formulated as to be free from checking and burning under extreme temperatures. Nor will it fatigue and loosen in the block and under no conditions will this material air harden or work harden. Due to the density of this material, these seats have the faculty of dissipating the heat trapped in the valve and materially reduce valve temperatures, thereby insuring longer valve life and less down time on heavy-duty engines. For further information write DIESEL PROGRESS, File 48, Box 8458, Los Angeles 46, California.

New Series of Industrial Diesel Locomotives

A series of industrial diesel locomotives, featuring a hydraulic drive, have been announced by the Whitcomb Locomotive Company, Rochelle, Illinois. The locomotives, known as Whitcomb Hydro-Motives, are designed to provide the smooth, uniform power of an electric drive, at far less cost, and to provide substantial economies in maintenance. They are available in sizes up to 25 tons. The new hydraulic drive affords a marked saving in engine wear because road bed shocks are absorbed by the fluid Hydro-Motive coupling instead of being transmitted to the engine, as happens in a rigid mechanical drive. The drive, in itself, is of extremely simple design, to further assure low maintenance costs.

Benefits also accrue to the locomotive operator by way of reduced fatigue and reduced accident hazards. There is no shifting of gears, no jerking starts. Power is smooth-flowing, uniform at all speeds. The Whitcomb Locomotive Company, of Rochelle, Illinois, builds an extensive line of industrial diesel locomotives, with hydraulic, mechanical and electric drives, in sizes up to 95 tons.

Appointments at General Motors

B. A. Dollens Cyrus R. Osborn

The board of directors of General Motors at a recent meeting elected Ronald K. Evans an executive vice president of the corporation. Mr. Evans has been vice president and group executive in charge of the general engine divisions. He is a director of General Motors and a member of the Operations, Policy and Administration Committees. Cyrus R. Osborn, vice president of General Motors and general manager of the Electro-Motive Division, was appointed group executive in charge of the engine group to succeed Mr. Evans. Mr. Osborn is a member of the Administration Committee. C. E. Wilson, president of General Motors, has named B. A. Dollens to succeed Mr. Osborn as general manager of the Electro-Motive Division. Mr. Dollens is at present assistant general manager. The directors elected Mr. Dollens a vice president of General Motors. The appointments are effective August 15.

Mr. Osborn was first employed by General Motors as an apprentice in the Dayton Engineering Laboratories Co. in 1921. He entered the overseas field in 1923 and after serving in various executive capacities, became managing directors of General Motors Nordiska at Stockholm, Sweden, in 1932. After other assignments abroad and in the United States, he became general manager of Adam Opel A. G. in 1937. In 1941 he became assistant to Mr. Evans in the General Engines Group. He served briefly as general manager of the Allison Division in 1943, and in the same year was elected a vice president of General Motors and appointed general manager of Electro-Motive Division.

Mr. Dollens joined General Motors in the Delco-Remy Division in 1925. By 1929 he had advanced to the position of plant manager. He became general superintendent of manufacturing a year later and manager of the foundry and battery operations in 1943. He was made general manager of the Saginaw Malleable Iron Division in 1945 and the next year was appointed assistant general manager of Electro-Motive Division.

Contract for Lima-Hamilton

The New York Central System announced recently the award of a contract to Lima-Hamilton Corp. for construction at Lima, Ohio, of 27 diesel-electric switching locomotives at a cost of approximately $2,400,000. The locomotives will be used in the complete dieselization of the Chicago River and Indiana Railroad and the Chicago Junction Railway, both Central affiliates. Six will be of 1,200 hp., and remaining 21 of 800 hp. each.

DIESEL ENGINE CATALOG

VOLUME FIFTEEN

ENTIRELY REVISED AND RE-WRITTEN

It's a big book, 374 pages, 10½" x 13¼", with fifty-two makes of Diesel Engines described and illustrated, plus a big Accessory Section and Market Place. Completely revised since Volume Fourteen was issued.

Volume Fifteen came off the press on September Fifth. Send your order in NOW and your copy will be mailed immediately from stock. $10.00 PER COPY

Engines Listed and Described in Volume 15

American Locomotive
Anderson O'Brien
Associate British Oil Engines
Baldwin Locomotive Works
Buda
Burmeister & Wain
Caterpillar
Chicago Pneumatic
Clark Bros.
Cleveland Diesel
Consolidated Diesel Electric
Continental
Cooper-Bessemer
Crofton
Cummins
Detroit Diesel
Electro-Motive
Enterprise
Fairbanks-Morse
Fulton
Graymarine
Hallett
Harnischfeger
Hercules
Hill
Ingersoll Rand
International Fermont
International Harvester
Lathrop
Lima-Hamilton
Lister-Blackstone
Mack
Murphy
MWM
Nordberg
Palmer
Rathbun-Jones
John Reiner
Russell-Newbery
Sheppard
Sterling
Stewart & Stevenson
Sun Shipbuilding
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Union
Venn-Severin
Washington Diesel
Waukesha
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Witte
Wolverine
Worthington

IT WAS READY SEPTEMBER 5th

DIESEL ENGINE CATALOG P. O. Box 8458, Cole Station, Los Angeles 46, Calif.

Enter my order today for a copy of the 1950 Diesel Engine Catalog, Volume Fifteen, Edited by Rex W. Wadman, for which I enclose $10.00, also payable at £4-0-0 to E. H. Doddrell, 342 St. Paul's Corner, Ludgate Hill, London E.C.4.

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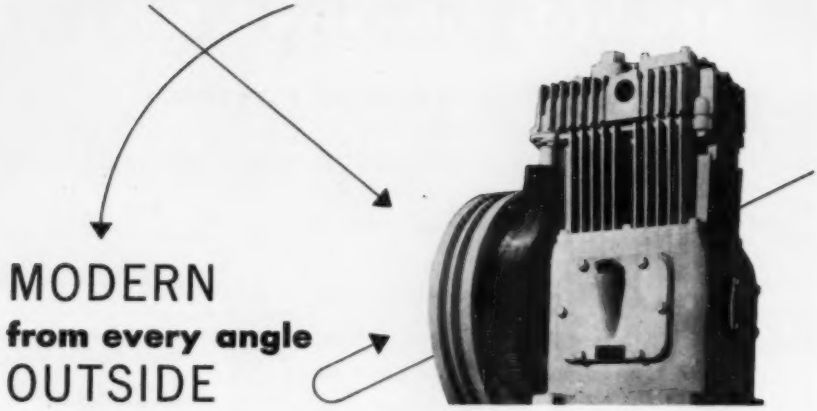
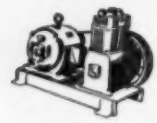
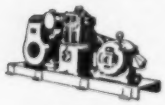
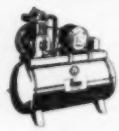


MODERN
from every angle
OUTSIDE

but the inside story of *Quincy* COMPRESSORS is even better!







Quincy Compressors not only look good as a part of a Diesel installation, they have an established reputation for dependability. Special design features for greater dependability and durability include — Timken bearings — Lynite rods — perfectly balanced crankshaft — copperfinned intercooler — automatic and positive lubrication. Quincy Compressors are available in a wide variety of sizes ranging from 1 to 90 c.f.m. Depend on a Quincy specialist to help you select the correct type and size compressor to meet your requirements. Write Dept. K-14 for details and prices.

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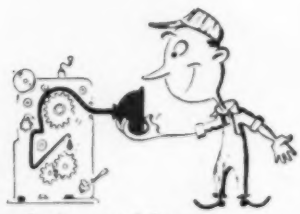
Manufacturers of Air Compressors Exclusively

Manzel **AUTOMATIC FORCE FEED LUBRICATION**



Reaches vital parts ordinary methods can't lubricate.

Meters the precise amount of oil needed.

Gives each wearing point a full-time 'oiler'.

Frees manpower for more productive jobs.

Manufacturers using Manzel Lubricators report that they save their initial cost many times over in reduced labor cost, lower oil consumption, and fewer breakdowns. "Manzels" are standard equipment on many makes of engines, pumps, compressors, hydraulic presses, conveyors, and other machinery. Or...you can install them on present equipment.

Manzel representatives will gladly supply technical assistance on lubrication problems.

Manzel

Division of
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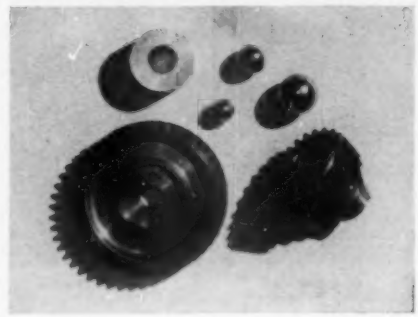
Tungsten Carbide Balls for Sizing of Internal Diameters



For accurate size control of internal diameters and low production costs, the use of tungsten carbide balls is becoming increasingly popular. Extreme hardness, high surface finish and compressive strength of tungsten carbide balls result in excellent surface finish and good size control and size uniformity of the finished part. Ball burnishing permits inexpensive, automatic production layouts, employing dial or hopper feeds for the parts and a re-circulating set up for the tungsten carbide balls. Even for large volume production replacement costs for carbide balls are negligible because of their long tool life.

Case hardened steel parts have been sized successfully with carbide balls, saving costly grinding or honing operations. Size of internal diameters can readily be controlled within plus/minus .0003-inch. Higher accuracies are possible depending upon uniformity of hardness, surface finish and size of the unfinished I.D. Tungsten carbide balls can be furnished in sizes from 1/32-inch to 3-inch diameter with size tolerances of plus/minus .000025-inch, sphericity tolerances of .000010-inch and surface finishes of 1 micro inch. Additional details upon request by writing DIESEL PROGRESS, File 66, P. O. Box 8458, Los Angeles 46, Calif.

New "Battery Selector" Bulletin for Diesel Starting Batteries

Electrical engineers, master mechanics, electrical gang foremen, road foremen and purchasing agents will want to obtain the new two-color eight-page "Battery Selector" bulletin for diesel locomotive starting batteries announced by the Gould-National Batteries, Inc. An unusually helpful element in the bulletin is a giant exploded view showing every construction feature of the Gould diesel battery and emphasizing the new positive Z-plate which outservices older types. The Z-plate's longer service is due to a new casting technique and a new plate design. Text, keyed with the exploded view, describes such features as sturdy intercell connectors, transparent "Televel" vent plugs, acid-tight post seals and other characteristics which provide uniform lasting power for diesel starting. The "Televel" vent plug permits maintenance men to determine whether water is needed without removing the plug.

Two types of battery lifting devices are shown and described: one, lifters for vertical handling; the other, handles for horizontal movement. Engineering specifications include dimensions, weight,

ampere hour capacity at the eight hour discharge rate, and the number of cells per battery for the following models: (1) high type, high capacity, molded rubber monobloc container; (2) high type, high capacity, rubber jars in wood tray; (3) low type, thick plates, molded rubber monobloc container; (4) low type, standard plates, molded rubber monobloc container; and (5) low type, standard plates, rubber jars in wood tray. Each type of battery is illustrated. Graphs give discharge characteristics for the five types of batteries listed. Copies of the "Battery Selector" may be obtained, without cost, from Gould-National Batteries, Inc., Trenton 7, New Jersey.

New Tappet Adjuster

The No. T-100 Tappet Adjuster has just been announced by Herbrand Tools. Specially designed for adjusting tappets on cars with overhead valves . . . motor may be kept running during adjustment. Spring loaded blade moves up and down inside handle. The hand that is holding the handle is kept steady because of the spring action. Broad notched tip keeps blade from slipping out of adjusting screw. It is claimed that this tool will speed up tappet adjustment.

Appointment at Purolator

Herbert J. Rieth has been appointed assistant purchasing agent of Purolator Products, Inc., of Rahway, N. J., manufacturers of Micronic automotive oil filters and other types of filtration equipment, it was announced by Ralph R. Layte, president. Mr. Rieth, who attended Rutgers Extension College, has worked in various capacities in the accounting and purchasing departments of Purolator Products. He was formerly with the American Cyanamid Company.

New Fractional HP. Speed Reducer

A new Heliocentric speed reducer, designed to save cost and conserve space in all in-line reducer applications in the ¼ to 1 horsepower range, has been announced by the Universal Gear Corporation, Indianapolis, Indiana. Designated as the Model 5-E, the new unit is suitable for any straight-line installation in which the input rpm. does not exceed 1,800. Maximum torque capacity is 1,000 inch-pounds. Overall design is unusually compact and stream-lined, according to the manufacturer, to conserve valuable installation space.

Features include the use of anti-friction ball bearings throughout; unusually quiet operation and lower cost than previous units of its type, due to simplified design and a reduction in the number of working parts; and high efficiency—especially as compared to that of many conventional worm-gear types of fractional horsepower speed reducers.

Aluminum Production Continues to Increase

"The U. S. aluminum industry is now producing primary metal at the rate of approximately 1,450,000,000 pounds a year, which is more than 17 per cent greater than total production in 1949," Mr. Donald M. White, Secretary of The Aluminum Association, said recently in reporting July production at 127,035,442 pounds as compared to 120,800,774 for the previous month. Mr. White explained that while production of primary metal has moved ahead to capacity levels the general industrial demand has also been expanding and military orders, relatively small at the outset of the Korean war, have been stepping up rapidly.

Mr. White further reported that all primary producers are operating on a voluntary allocation basis and in each case are attempting to supply their established customers in proportion to previous requirements. Shipments of aluminum sheet and plate during July amounted to 90,937,020 pounds as compared to 93,001,858 pounds in June, Mr. White reported. July shipments of permanent-mold rough castings (excluding pistons) by member companies of the Association's Foundry Division amounted to 1,996,047 pounds with a dollar volume of $918,466.

When is a Cotton Thread Not a Filter?
Photomicrograph of thread illustrated here gives you the answer. Note that it is a hollow tube. Obviously when compressed no oil can travel through it. See test tubes for proof.
See comparison of a compressed, unsupported cartridge with DELUXE. The spring, exclusive with DELUXE, prevents DELUXE cotton threads from collapsing or compressing.
compressed
maintained density
spring maintains density
compressed
WHY IS THERE NO SUBSTITUTE FOR A DELUXE CARTRIDGE?
Only a genuine DELUXE has the spring-and-cone built right into the cartridge. Both are essential to DELUXE oil cleansing which travels the oil the full length of the filter instead of the short side to center way. There are many other reasons, too. Send for FREE "KEY TO CLEAN LUBRICATION" BOOKLET. Write DeLuxe Products Corporation, 1416 Lake St., LaPorte, Indiana.
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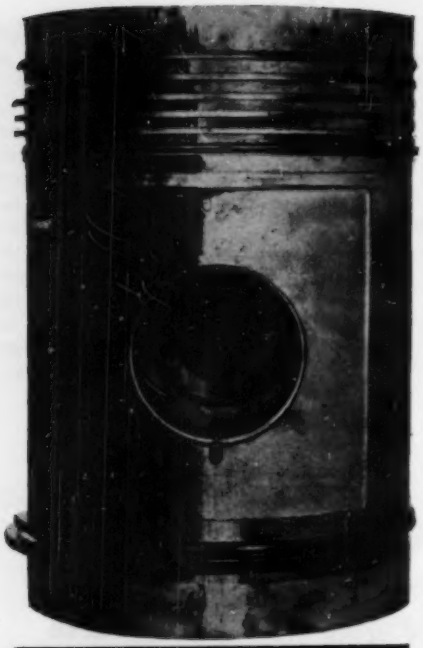
WHY IS IT EASIER TO DRIVE OFF DILUTION IN CLEAN OIL???
Because clean oil gives off its dilution at engine crankcase temperatures of from 165° to 185° F whereas in dirty oil dilution is not driven off until temperatures of from 240° to 260° F are reached.
DELUXE Oil Filter
DOES MORE THAN STRAIN OIL . . . MORE THAN FILTER OIL
ACTUALLY CLEANSES OIL



Decarbonize Aluminum Pistons FASTER!

Removing products of combustion from aluminum pistons, piston rings, connecting rods can now be done *faster, easier,* more economically with Oakite Composition No. 61. Safe to surfaces, used in cold solution form, Oakite Composition No. 61 quickly removes dirt, oil and carbon . . . leaves clean surfaces for speedy, accurate inspection before engine repair or overhaul.

Technical Data is FREE

You can get step-by-step directions on decarbonizing steel and aluminum pistons merely by writing address below. Or, if you prefer, on-site service is freely available to handle this work or any other Diesel maintenance cleaning operation necessitating immediate action. Consult Oakite today!

ALSO *get data on:*

- Cleaning Heat Exchangers
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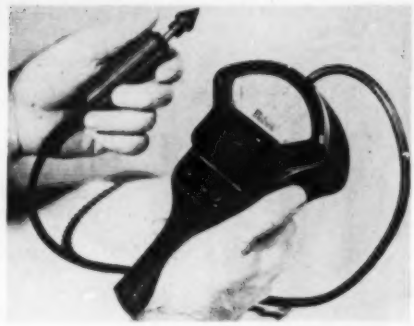
Technical Service Representatives in Principal Cities of U. S. & Canada

Appointment at Nordberg

Carl O. Friend

Mr. Carl O. Friend has been appointed manager of the Gasoline Marine Engine Department of Nordberg Manufacturing Company, Milwaukee 7, Wisconsin, according to an announcement by James A. Friend, senior vice president. Mr. Carl Friend will assume the duties of H. Van Schaack, who has resigned. Messrs. W. G. Hawkins and W. F. Reeder will assist in gasoline marine engine sales and service from the Milwaukee office of Nordberg. Personnel assigned to gasoline marine engine sales and service in Nordberg's district office will remain unchanged. Mr. Friend attended the University of Wisconsin and Cornell University. He joined Nordberg in the crusher division in 1941 and the following year enlisted in the U. S. Coast Guard, where he served three years in anti-submarine patrol duty off the Atlantic coast. After the war, Friend returned to Nordberg and served in a business administration capacity. In 1948 he was appointed sales research department manager in charge of all advertising, publicity and sales promotion activities of the company.

Electric Hand Tachometer Has New Ranges



Now available is the Metron Type 25D Hand Tachometer with new speed measuring ranges: 100-1000, 200-2000 and 500-5000 rpm. and fpm.; and 10-100, 20-200, 50-500 fpm. Having the same high accuracy and dependability as other Metron series 25 Tachometers, these new ranges are ideally suited (without range extending adapters) for speeds encountered in motor and generator testing, process control, and maintenance work. Range extending adapters are available to measure speeds as low as 20 rpm. and as high as 50,000 rpm. for special applications. Other outstanding features include: quick response—can be used for acceleration tests; self calibrating check circuit; undamaged by overspeeding or selection of wrong range; sustained high accuracy with long life; and low operating torque. Supplied in attractive carrying case complete with accessory tips, extension, feet per minute discs and instructions. Further information may be had by writing DIESEL PROGRESS, File 59, P. O. Box 8458, Los Angeles 46, California.

TITUSVILLE forgings

. . . a dependable source for precision forgings

Constant Research—goes on endlessly in Titusville Forge's efficient shops and laboratories—in heat treating methods, in forge and machine shop procedure — to develop new manufacturing techniques, new cost saving advantages. Let Titusville engineers work with you now — in applying this advanced engineering to your FORGING requirements.

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TITUSVILLE FORGE DIVISION
TITUSVILLE, PENNA.

Promotes Rapid and Effective Servicing of *All* Makes of Diesel Nozzles and Injectors

All Diesel injection nozzles, due to the nature of their operation and the severe conditions to which they are subjected in service, require maintenance at regular intervals. That's why the need of nozzle cleaning and testing is emphasized in every Diesel builder's instructions.

Bacharach Nozzle Tester provides a dependable means for checking Diesel injection nozzles accurately. This tester is outstanding for its versatility in use. It is equally well suited for permanent test bench installation and portable use to test nozzles when servicing engines in the field.

A complete line of connector fittings is available for testing nozzles made by American Bosch, Caterpillar, Excello, Demco, International Harvester, and Bendix-Scintilla. There are also available specially designed fixtures for testing GM 71 and Cummins unit injectors. These fixtures are assembled into self-contained stands incorporating the tester shown above.

For complete information request Bulletin 617

BACHARACH Industrial Instrument Company
7000 Bonnett Street • Pittsburgh 8, Pa.

DIESEL ENGINE CATALOG

The purpose of this little advertisement is to chat with you for a few moments about why YOU should have a copy of this splendid reference book available when YOU need it. For fifteen years it has been referred to as "the bible of the industry."

All of the smart diesel engine salesmen carry this book around in their car. When they run into some new competition with which they are not too familiar—the Diesel Engine Catalog gives them full, detailed information when they need it most and need the data to be accurate.

The Consulting Engineer keeps this book in his reference file. It immediately gives him ALL diesel engines coming within a given horsepower range, speed range, weight range.

People who sell, people who buy, people who use diesel engines need this book. Will you order this book today? Price $10.00 prepaid.

DIESEL ENGINE CATALOG
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100 KW Reiner Diesel-Generator installed in a large New Jersey department store for stand-by duty. Time and again, its instant, automatic starting has insured uninterrupted light and elevator service when outside power failed.

- Reiner generating sets come in a wide range of sizes and types for every power need.
- They're designed for utmost economy, efficiency and dependability in operation
- Reiner's 25 years' experience and worldwide reputation for quality materials and expert workmanship assures you of the very latest in technical design and engineering.

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FREE BULLETINS on standard units sent on request. Write today, stating your requirements.

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PRESSURE PLUG

. . . seals pressure-tight without the use of sealing compounds. Features the "Dryseal" Pipe Thread originally developed for use with SO_2, ammonia, and other refrigerants. Offers a valuable solution to leakage problems in high pressure equipment of all kinds.

Unique design of the "Dryseal" Thread provides actual crushing and sealing at both major and minor diameters, effectively preventing spiral leakage, even under extreme pressures.

Incorporates all the important features of the regular UNBRAKO Pressure Plug, including fully formed threads, uniform taper and perfect roundness.

A full range of sizes from 1/16" to 1¼", National Pipe Thread Fuel, is available. Full details are given in Bulletin 675.

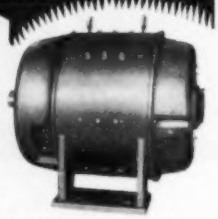
OVER 47 YEARS IN BUSINESS

See us at Booth 2434, Convention of National Metal Congress and Exposition, Chicago, Oct. 23 to 27.

STANDARD PRESSED STEEL CO.

JENKINTOWN 7, PENNSYLVANIA

AC DC KURZ & ROOT GENERATORS



Both AC and DC type available in self-excited and self-regulated designs—two bearing; single bearing; direct-connected; single bearing quill mounted, in a wide speed range, sealed prelubricated bearings, 1 to 100 K.W. range.

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KURZ & ROOT Company

APPLETON · WISCONSIN

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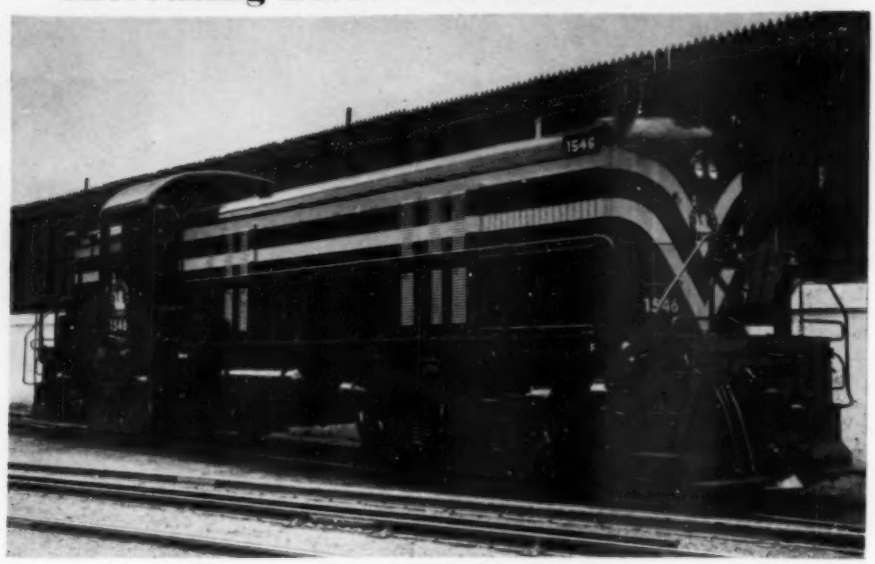
PETROMETER

FOR ALL TANKS
FOR ALL LIQUIDS
FOR ALL DEPTHS
FOR ALL DISTANCES

PETROMETER CORPORATION

8 STAR SQUARE LONG ISLAND CITY 1, N. Y.

Increasing Diesel Locomotive Traction



An increase of nearly 25 per cent in continuous tractive effort on Alco-GE 1,600-hp. road switching locomotives has resulted from major improvements in traction motor design, it was announced by American Locomotive and General Electric. In announcing the new design, Alco-GE—originators of the all-purpose road switching locomotive nearly four years ago—stated that the new motor is the nearest approach yet to a self-protecting traction motor. It allows operation, in many cases, up to the point of locomotive wheel-slip without entering the range of short-time restrictions. This is accomplished with normal gear combinations which provide high maximum speed as well as increased hauling ability.

Continuous operation up to 52,500 pounds tractive effort is available with the new road switcher traction motor, an increase of almost 25 per cent over the former 42,500-pound tractive effort for the same 65 mph. maximum speed gearing. Motor performance has been improved through the use of new insulating materials. The engineer's load meter now shows a maximum permissible continuous current of 1,085 amperes, the former maximum being 900 amperes. Additional engineering changes and modifications have been designed to provide added economies in road switcher operation and maintenance as well as greater versatility. This all-purpose locomotive can now be offered with dynamic braking as a modification. Braking resistors are then located in the rear hood. Engine-generator assembly interchangeability between the road switcher and other road locomotives has been simplified by substituting direct gear drive for belt drive on the road switcher auxiliary generators. Standard base weight of the 1,600-hp. all-purpose locomotive has been increased to 240,000 from 230,000 pounds. As a modification, weight can be increased to 250,000 pounds. Uniform axle loading is maintained as fuel and water are consumed.

The standard locomotive is equipped with air brake schedule 6-SL, with clasp brakes and G-4630 shoes on all wheels of the 4-wheel, 2-motor trucks. Six-wheel, 4-motor trucks are offered as a modification. The approved traction-motor overhaul period has been increased to 300,000 miles. Traction-motor refinements include use of felt-wick lubrication of axle suspension bearings and a self-closing lubrication door on the gear case. Lubrication periods for traction-motor armature bearings have been greatly improved. Permanent-packed, high-temperature lubrication of the traction-motor armature bearings, adopted as standard a year and a half ago, has proved most successful, and is being continued. This lubrication, operated from overhaul to overhaul without greasing service, has not only reduced maintenance, but has also increased armature-bearing reliability and life.

New Booklet by Twin Disc

A new issue of *Production Road*, featuring the latest developments in hydraulic drives, has been announced by the Twin Disc Clutch Company, Racine, Wisconsin. The history of hydraulic power transmission is briefly traced, followed by a profusely illustrated series of applications of the newest Twin Disc hydraulic drives—the Hydro-Sheave, the Hydro-Wynd, and the Model HUD Disconnecting Coupling. The magazine is available on request from the Twin Disc Clutch Company, Racine, Wisconsin.

Insist on VELLUMOID for Quality

THE STANDARD SHEET PACKING
FOR OIL, WATER AND GASOLINE

THE VELLUMOID COMPANY · WORCESTER 8 · MASS.

Change of Corporate Identity

Enterprise Engine and Foundry Company, manufacturer of marine and stationary diesel engines, process machinery and commercial oil burners, has changed its corporate identity to Enterprise Division, General Metals Corporation, with Paul I. Birchard named vice president and manager, according to an announcement by William E. Butts, head of Enterprise operations. The change became effective upon the consolidation of Enterprise with two other nationally known manufacturing concerns, Adel Precision Products Company of Burbank, California, and General Metals Corporation, with California plants located at Los Angeles and Oakland and a third at Houston, Tex.

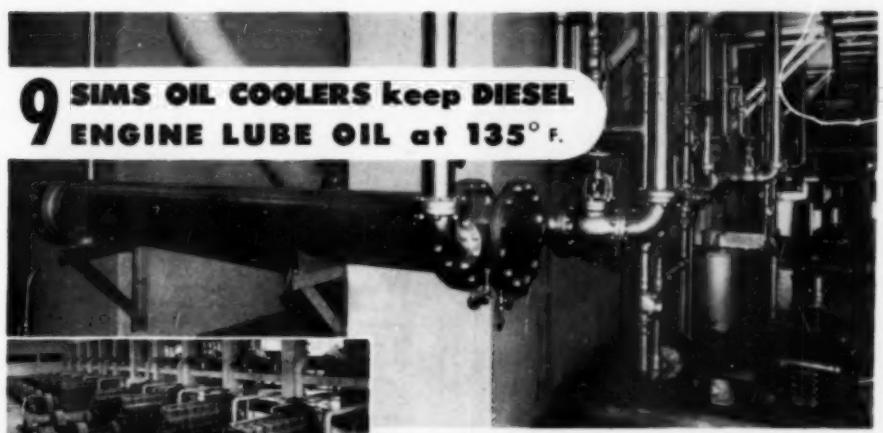
Butts, who was named president of the new corporation, also announced that there will be no change in the existing operations or policies of any of the divisions. Enterprise, located at San Francisco, manufactures a wide range of diesel engines for both marine and stationary use, various types of process machinery, in addition to a line of commercial oil burners. The Adel Division manufactures an extensive line of hydraulic, fuel and de-icing equipment for aircraft in addition to hydraulic control equipment for industry, while the Metals Division is widely known for its foundry work in producing forgings and castings at its various plant locations. Officers of the new corporation, in addition to Butts as president, are William A. DeRidder, long time head of both General Metals and Adel, chairman of the board; W. E. Clayton, Jr., secretary; and Roy C. Menzel, treasurer. Principal officers of the Adel Division are Richard A. Stumm, vice president of manufacturing, and Fred T. Miller, vice president of engineering and sales. For the Metals Division, Frank L. Stamm is vice president at the Los Angeles plant, Harold W. Schmid at Houston, with Philip C. Rodger named vice president and manager of the Oakland works. Corporate offices of the newly formed consolidation are now located in San Francisco.

Associated Equipment Distributors Meeting

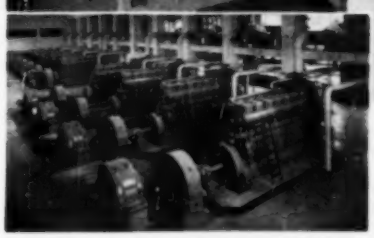
The 11th Region of the Associated Equipment Distributors, which consists of membership in California, Nevada, Arizona and Hawaii, is holding its Fall meeting at the Santa Barbara Biltmore October 26th and 27th. This is an annual meeting and will be attended by AED and Allied Members and their wives. Those who plan to attend should make their reservations by writing the Executive Manager of the Santa Barbara Biltmore, Santa Barbara, Calif.

Registration will be Thursday morning, October 26th, with an interesting program for the balance of the day, including a joint AED-AGC business session starting sharply at 1:00 which will take up most of the afternoon.

DIESEL ENGINE CATALOG is just off the press in its Fifteenth Edition. Completely revised and up-to-date, it is invaluable to design engineers and buyers. ORDER COUPON ON PAGE 66.



9 SIMS OIL COOLERS keep DIESEL ENGINE LUBE OIL at 135° F.



9 -1700 hp. Worthington Diesels—equipped with Sims Lube Coolers furnish power for one of the world's largest sewage disposal plants, The Hyperion Sewage Plant at Los Angeles, California.

at HYPERION SEWAGE PLANT LOS ANGELES, CALIFORNIA

Lube Oil for each of 9 -1700 hp. Worthington turbo-charged, dual fuel, diesels is cooled to 135° F. by a SIMS Lube Oil Cooler. SIMS Heat Recovery Equipment is engineered to meet specific conditions. SIMS Jacket Water Coolers protect internal combustion engines. SIMS Exhaust Gas Boilers convert waste exhaust heat into hot water, steam or hot air for heating or process. Send Diesel heat recovery problems to The Sims Co., Box 1096DP, Erie, Pa., U. S. A.

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OIL HEATERS • OIL COOLERS • FEED WATER HEATERS AND UNIT TYPE PULVERIZERS

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ALL-METAL FLEXIBLE TUBING

Regardless of how you use tubing, there's a size and a type of Titeflex that will do your job. Titeflex is made in diameters from 3/16" to 3", to solve all problems of size. It's made in plain steel, stainless, brass, bronze, monel and inconel to handle all kinds of corrosive gases and liquids. And it's made in types to take temperatures up to 1650° F and pressures up to 6800 lbs.

Titeflex is constructed entirely of metal, with no packing to wear out. It has *both* flexibility and strength. That's why it does *more* jobs and *lasts longer* doing them.

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500 Frelinghuysen Ave., Newark 5, N. J.

TITEFLEX STAYS TIGHT WHEN THE GOING IS TOUGH

WEST COAST DIESEL NEWS

By **FRED M. BURT**

THE Central Station Engineering Company, Tucson, Arizona, who designed and built the Trico Generating Station, which uses natural gas as fuel for its big Superior engines, changed its name to Central Station Equipment Company, and is acting as agents for several large companies, including the Superior Engine Division of the National Supply Co., in the West Texas, New Mexico and Arizona teritory. C. F. Lewis is general manager.

THE seiner *Cape Karluk* of the Alaska herring fleet, owned by Cape Karluk Fisheries, and fishing for Wakefield Fisheries, has been re-powered with a 6-cyl., 300-hp. Union diesel. She also has a 40-hp. Union diesel auxiliary. The main diesel is equipped with an Air-Flex clutch.

THE 103-foot tuna clipper *Mondego* recently completed by Puget Sound Boat Bldg. Co. for Captains Frank Perry and Bud Levitt is powered with a 440-hp. Washington diesel.

NICHOLAS BOBRICK, formerly with Crofton Diesel Engineering Company, also having been engaged in diesel engine sales in the San Diego and San Pedro territories for the past 20 years, has joined Engine Sales and Service Company to work out of their Terminal Island branch as salesman for P & H, Witte and Murphy diesel engines.

POWERED with a 3-cyl. General Motors diesel, purchased from the West Coast Engine & Equipment Co., Fort Bragg, Calif., is a new 40-foot combination boat built by Frank J. Hyman, Fort Bragg boat builder.

PURCHASED by Blue Diamond Corporation, Los Angeles, for use in mining limestone at their plant near Arden, Nevada, a 1¾-yard Link-Belt crawler shovel, powered with a Caterpilar 142-hp. diesel engine.

THREE all-purpose type 1,600-hp. diesel-electric locomotives have been purchased from Fairbanks, Morse & Co., at a cost of $420,000.00, by Union Pacific, to augment the large fleet of diesels already in use in the western states.

THE *Corsair*, 75-ft. fishing boat, owned by four San Pedro men, has been re-powered at the J and B Engine Works, San Pedro, with a new Pacific diesel of 252-hp., supplied by J. T. Siler Co.

PURCHASED by Webb Bros., San Diego, a 3-cyl., 60-hp. P & H diesel to power a deep-well U. S. Pumps, Inc., turbine pump, to be used for irrigation purposes.

THE Los Angeles County Road Dept. has placed an order with Shaw Sales & Service Co., Los Angeles, for two Link-Belt 1½-yard crawler shovels, powered with 142-hp. Caterpillar diesels, to be used for general purpose work in pits, quarries, etc.

AS REPORTED by Wilvers and De Fever, naval architects San Pedro and San Diego), current work includes repair supervision *Nyna Rose II*, power 250-hp. Washington diesel, at Long Beach Marine Repair Co.; at Peterson Boat Bldg. Co., Tacoma, design of two 96-foot tuna clippers under construction, *Golden Glow* for Frank Fernandes, *Miss California* for Manuel Sousa, each powered with a 400-hp. Enterprise diesel, with 2 G.M. auxiliaries.

FOR USE in bridge construction work in Arizona, Consolidated-Western Steel Co., Los Angeles, has converted a double drum steam hoist to diesel power, using a Caterpillar D-318 and Twin Disc clutch.

BUDA Engine & Equipment Co., managed by C. C. Kirk, a wholly-owned subsidiary of the Buda Co., Harvey, Ill., will occupy a building under construction at 8th Ave. S., Hinds St. and Airport Way, Seattle.

THE latest addition to Pacific Towboat & Salvage Co.'s fleet for complete service to fishing vessels in Galapagos, Central American and Mexico waters, is newly named tug from San Pedro, *Amigo*, powered with a 250-hp. Fairbanks-Morse diesel.

THE three 119-foot tuna clippers under construction at Tacoma Boat Building Co., designed by Wilvers & De Fever, will each be powered with a 615-hp. Superior diesel.

FROM Engineering Controls, Inc., Los Angeles, two Vapor Phase units for heating chemicals in

NEED TRAINED DIESEL MEN?

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On your job they can save you money, and make you money.

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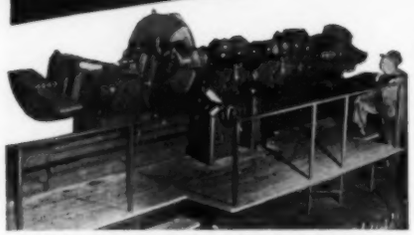

The largest Crankshaft Grinding Machine in the world used in an independent repair shop

Four machines giving range from the smallest up to crankshafts with stroke of 15" and 200" O.A.L. Complete grinding service for locomotive, stationary, marine, automotive and compressor crankshafts.

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NATIONAL WELDING & GRINDING CO.
2929 CANTON ST. DALLAS 1, TEXAS
THE MOST COMPLETE ENGINE REBUILDING SHOP IN THE SOUTHWEST

What a WHALE of a saving Mechanized Cleaning Means to Diesel Shops!

WHEN stubbornly carbonized diesel parts are cleaned in Magnus Aja-Dip Machines, with Magnus 755 as the cleaner, you can turn out in ½ to 2 hours (depending on the parts being cleaned*) what ordinary cleaning methods take 1 to 4 hours to do.

At the same time you get much better cleaning, with 95% of all hand work eliminated. The cleaning solution lasts many times longer than any other available cleaner for carbonized oil deposits. In fact, your cleaning materials costs would be reduced by at least 50%.

Operators of 60% of the diesel horsepower on Class 1 roads are using the Magnus Aja-Dip-755 method for cleaning their diesel parts.

It seems logical to suggest that you take a long and careful look at the Magnus method from the viewpoint of YOUR diesel cleaning operations.

**Cleaning Time When Magnus 755 and the Magnus Aja-Dip Machine Are Used:*

Heads	1½ hours	Pistons	20 minutes
Liners	2 hours	Blowers	20 minutes
Rods	20 minutes	Valves	15 minutes
		Strainers	10 minutes

MAGNUS CHEMICAL CO. • 85 South Ave., Garwood, N. J.
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Columbia, with its years of experience, brings to you a wide line of performance proved, sturdily built, A.C. and D.C. Generators. A.C. Generators: 6¼ to 1000 KVA. D.C. Generators and Exciters: 2 to 300 KW. Available in Single or Two Bearing Construction. *Write today for information. Our engineers will be glad to review your requirements. Prompt delivery.*

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4519 Hamilton Ave., Cleveland 14, Ohio

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FRAM C-1126-PBT-4 FILCRON ELEMENTS

Have several thousand available for immediate shipment subject to prior sale. This is the 8x3 in. Navy Standard fuel filter element. Replaces 8" Commercial **No. 1750-N PURO-LATOR PR-150** or any of the 8x3 in. fuel elements manufactured to Bureau of Ships specifications.

This is Surplus Navy material in perfect condition, export packed. **AT ABOUT 10%** of original cost. Write for sample and price; state quantities required. We invite inquiries on other types of fuel and lube oil elements.

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plant of E. Acidos Hipocloritos, S.A., near Havana, Cuba; to be used on two 12-cyl., 900-hp. General Motors diesels. Recovering all jacket and about half of the exhaust heat, producing 5,400 lbs. of steam per hour, the steam will be used at 10 lbs. in coils to heat chemicals, then condensed, and condensate returned for engine cooling. The completely closed systen, also eliminates radiator and power-consuming fan drive.

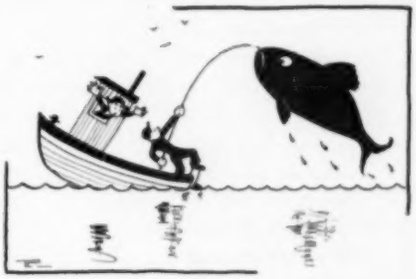
PURCHASED by contractors P. & J. Artukovich, Inc., Los Angeles, a new Bay City truck crane, powered with 150-hp. Cummins diesel in the chassis, 165-hp. Cummins diesel on the crane.

THE 50-year-old 84-foot *Tom & Al* starts its second half century re-powered with a new 200-hp. Hendy diesel, towing to Alaska after having been a mail and passenger boat, a halibut vessel, and cannery tender.

FOR McGregor Ranch, Ojai, Calif., a Caterpillar diesel industrial engine to power a Layne & Bowler deep-well turbine pump used for irrigating.

AL-PAC Engine & Equipment Co., distributor for Nordberg Mfg. Co. in the Puget Sound and Alaska areas, has moved into new offices, parts dept., and marine installation facilities at 2520 Westlake Ave., N., Seattle, handling the complete line of Nordberg marine engines from 10 to 9,000-hp. C. S. Harris is manager. Bill Hough in charge of parts and service.

PURCHASED by 20th Century-Fox for location lighting, a portable General Motors diesel, General Electric generator, 125-kw. set, the fifth similar unit to be supplied to major moving picture companies by Anderson-O'Brien Co., Los Angeles.



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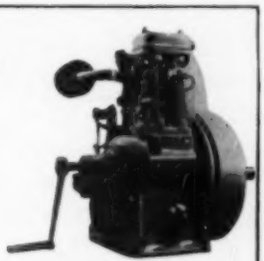

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Standard
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PIERCE
GOVERNORS
assure maximum
performance and
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Pierce Centrifugal Governors give exact control of engine RPM to meet the varying conditions of any job. Engine protection is guaranteed!

PIERCE governors engineered specifically for Diesels assure long, trouble-free operation . . . usually for the life of the engine. Many Diesels feature PIERCE as standard equipment to assure maximum protection, better performance and less maintenance.

PIERCE replacement governors to fit most engines are available through your local distributor.

For your distributor's name or for specific information on new engine design or special governing problems, write or call Sales Department, Pierce Governor, 1603 Ohio Ave., Box 1,000, Anderson, Indiana.

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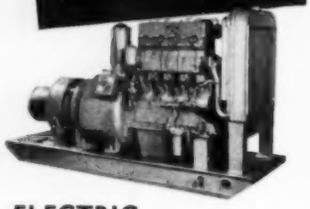

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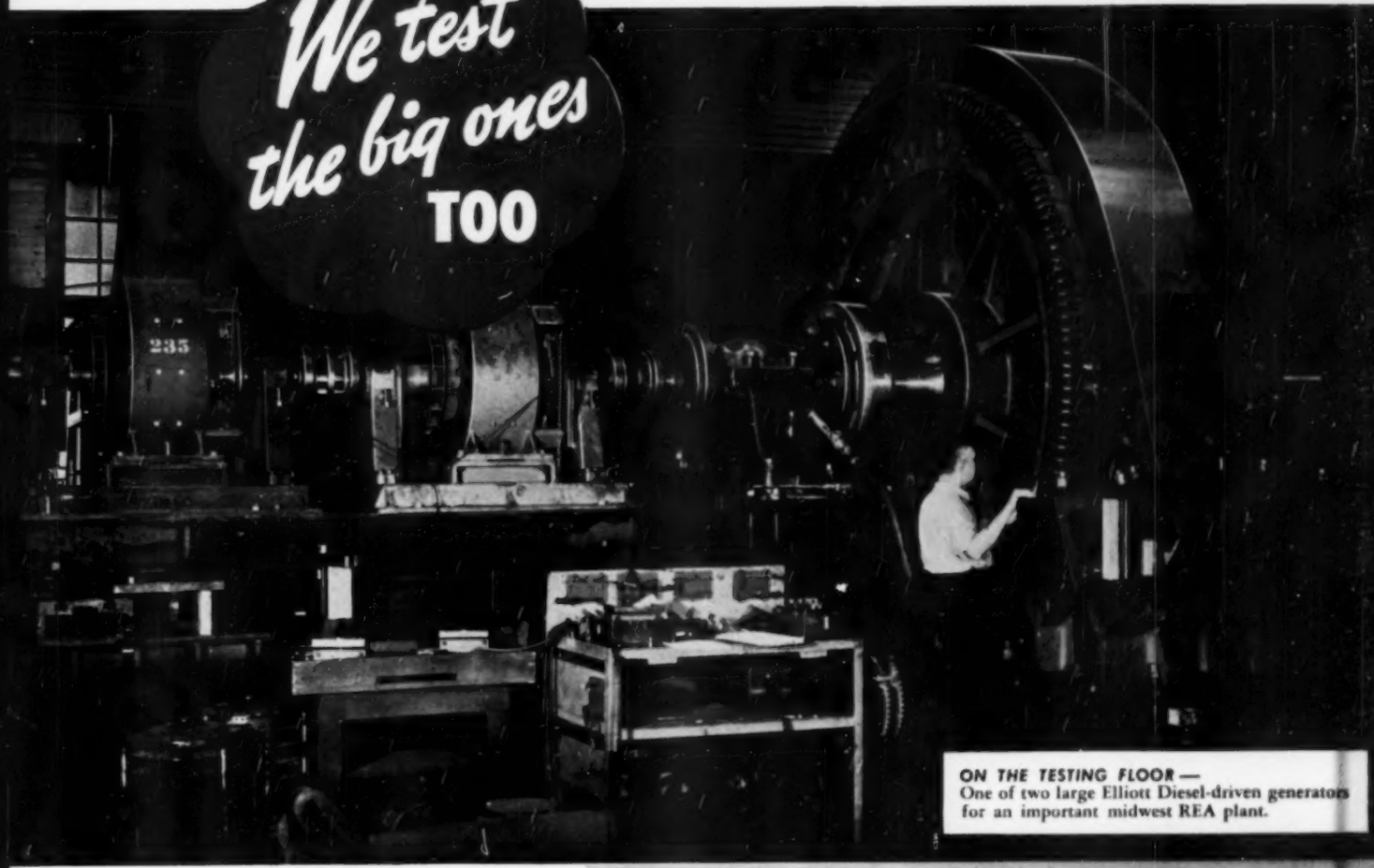

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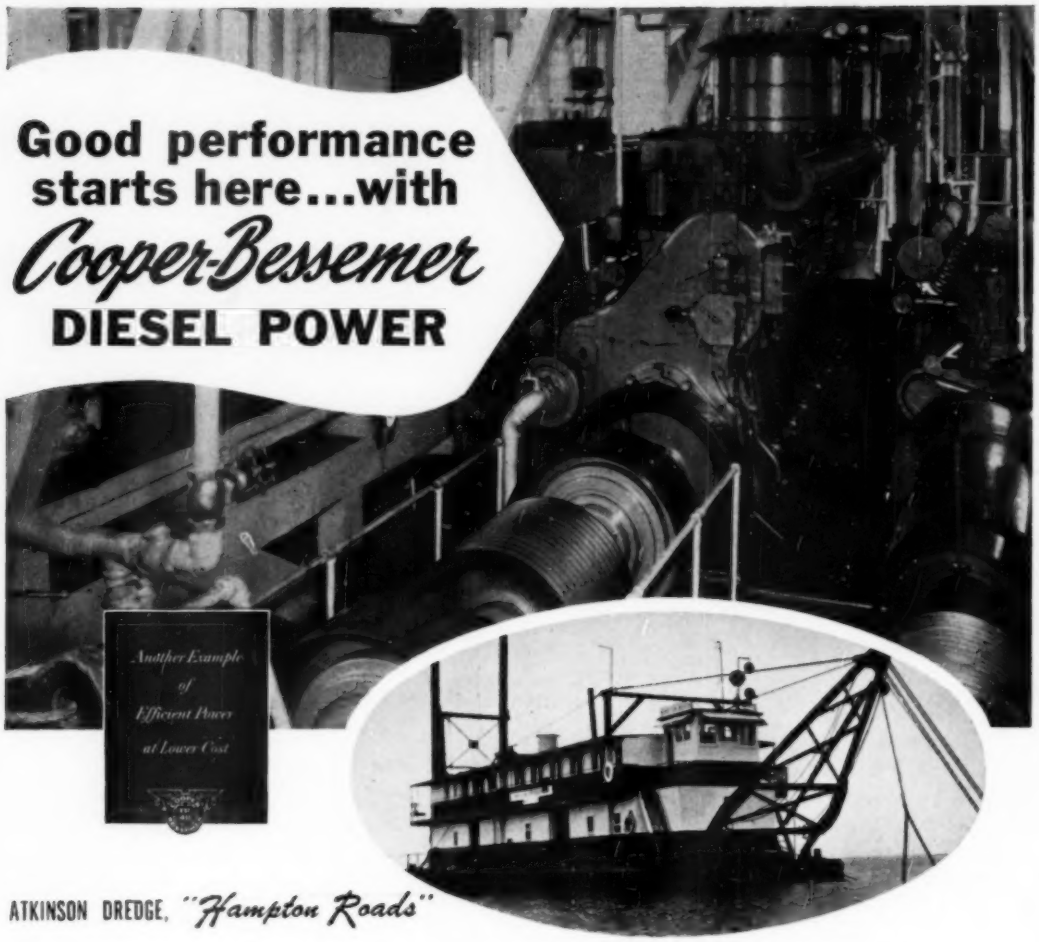

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